DOCUMENT RESUME

ED 268 696 EA 018 471

TITLE	Administration of Maintenance and Operations in California School Districts: A Handbook for School Administrators and Governing Boards.
INSTITUTION	California State Dept. of Education, Sacramento.
PUB DATE	86
NOTE	101p.
AVAILABLE FROM	Publication Sales, California State Department of Education, P.O. Box 271, Sacramento, CA 95802 ($6.75 prepaid; California residents add sales tax).
PUB TYPE	Guides - Non-Classroom Use (055)
EDRS PRICE	MF01 Plus Postage. PC Not Available from EDRS.
DESCRIPTORS	Budgeting; *Building Operation; Custodian Training; Design Requirements; *Educational Administration; *Educational Facilities; Educational Facilities Improvement; *Educational Facilities Planning; Elementary Secondary Education; Facility Requirements; Management Systems; Operating Expenses; Program Evaluation; Resource Allocation; School Buildings; School Construction; *School Maintenance; School Safety; State Standards
IDENTIFIERS	*California

ABSTRACT

This handbook provides information that administrators of maintenance and operations in California schools can use in systematically planning and scheduling school facility support services. The first unit, chapter 1, is designed to help members of school district governing boards establish board policies, regulations, and procedures. Topics covered include facility management, facility standards, personnel policies, selection of equipment and supplies, facility design, and site utilization. The second unit, chapter 2, outlines current practices in the field so that the director of maintenance and operations will be able to implement the policies of the governing board. Topics include the design and implementation of an organizational plan, personnel management, budget preparation, acquisitions, monitoring facilities, and evaluating the maintenance and operations program. The third unit, chapters 3 and 4, describes the functions of maintenance and operations, and suggests organizational procedures that should lead to programmed budgeting, systematic management, and efficient use of personnel. School maintenance is also discussed in the context of inflation, declining enrollments, reduced revenues, and competing budget priorities. The fourth unit, chapter 5, discusses the use of school facilities, energy management, control of hazardous materials, pest control, school security, and access for the handicapped. Appended are excerpts from selected legal references, time schedules for custodial tasks, and evaluation questions for a district's custodial program. (TE)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)
☒ This document has been reproduced as received from the person or organization originating it
☐ Minor changes have been made to improve reproduction quality
● Points of view or opinions stated in this document do not necessarily represent official OERI position or policy

"PERMISSION TO REPRODUCE THIS MATERIAL IN MICROFICHE ONLY HAS BEEN GRANTED BY
T. Smith
TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

ED268696

ADMINISTRATION
OF [illegible]

[illegible] SCHOOL ADMINISTRATORS

[illegible]

EA 018 471

ADMINISTRATION of MAINTENANCE and OPERATIONS in CALIFORNIA SCHOOL DISTRICTS

A HANDBOOK FOR SCHOOL ADMINISTRATORS AND GOVERNING BOARDS

Prepared under the direction of the
School Facilities and Transportation Division
California State Department of Education

In cooperation with the
Maintenance and Operations Research and Development Committee
California Association of School Business Officials

Publishing Information

Administration of Maintenance and Operations in California School Districts: A Handbook for School Administrators and Governing Boards was prepared under the direction of the School Facilities and Transportation Division, California State Department of Education. The manuscript was edited by Marie A. McLean and Edward T. O'Malley of the Bureau of Publications, working in cooperation with J. D. (Dave) Smith, Committee Member-at-Large, CASBO's Maintenance and Operations Research and Development Committee. The handbook was prepared for photo-offset production by the staff of the Bureau of Publications, California State Department of Education. The document was published by the Department, 721 Capitol Mall, Sacramento, California (mailing address: P.O. Box 944272, Sacramento, CA 94244-2720). It was printed by the Office of State Printing and distributed under the provisions of the Library Distribution Act and *Government Code* Section 11096.

© Copyright 1986, California State Department of Education

Additional copies of this document are available for $6.75 each, plus sales tax for California residents, from Publications Sales, California State Department of Education, P.O. Box 271, Sacramento, CA 95802-0271. A list of other publications available from the Department may be found on page 85 of this publication.

THEODORE R. SMITH
Editor in Chief

Contents

Page

Foreword vii
Preface viii
Acknowledgments ix

Chapter 1. Responsibilities of the Governing Board 1
  Facility Management 1
    Promoting Health and Safety 1
    Operating Facilities Economically 1
    Protecting Capital Investments 2
    Correcting Obsolescence in Structures 2
    Promoting School and Community Pride 2
  Facility Standards 2
  Personnel Policies 3
  Selection of Equipment and Supplies 3
  Facility Design and Site Utilization 4

Chapter 2. Implementing the Governing Board's Policies 5
  Implementing the Board's Policies 5
  Designing and Implementing an Organizational Plan 5
  Exercising Sound Personnel Management 10
    Adequate Staffing 10
    Job Descriptions 10
    Recruitment 11
    Selection and Assignment 11
    Standards for Job Performance 12
    Staff Development 12
    Staff Relations 14
  Developing and Presenting a Budget 14
    Projecting Budget Needs 15
    Establishing a Reserve Fund 15
    Presenting the Preliminary Budget 15
    Planning for Budget Expenditures 18
  Acquiring Facilities, Equipment, and Supplies 18
    Specifications and Competitive Bidding 19
    Quantity Purchases 19
    Scheduling of Purchases 19
  Monitoring the Planning, Constructing, and Equipping of Facilities 19
    Utilizing Experience 19
    Standardizing Components 20
    Specifying Low-Maintenance Materials 20
    Requiring Supervision and Inspection 20
    Choosing Suppliers of Mechanical Equipment 20
    Purchasing Furniture and Equipment by Specification 20
    Arranging On-Site Training 22
    Filing Plans and Specifications 22
    Obtaining a Building Manual 22
  Evaluating the Effectiveness of the Maintenance and Operations Program 22

Chapter 3. Managing a School District Maintenance Program 23
Terms Related to Maintenance 23
Status of School Maintenance 24
Planned Maintenance Program 24
Standards, Goals, and Objectives 24
Need for a Systematic Program 25
  Maintenance Objectives 26
  Key Factors of a Program 26
Systematic Maintenance Management Program 28
  Program Functions 29
  Program Organization 29
  Elements of a Successful Program 29
  Measurement of Program Effectiveness 31
Costs for a Systematic Maintenance Management Program 32
Effective Organization 33
  Size of School Systems 33
  Useful Life of Facilities 34
  Types of Building Materials and Finishes 35
  Use of Facilities 35
  District Staff Labor or Contract Maintenance 35
Scheduled Maintenance Program 35
Maintenance Shop Needs 36
Annual Inspections 36
Types of Work Orders 38
  Capital Outlay Work Orders 38
  Service Work Orders 38
  Work Orders for Emergency and Unanticipated Work 40
Control of Maintenance Costs 40
  Good Maintenance Practices 40
  Continuous Evaluation 40
  Good Recordkeeping 41

Chapter 4. Managing School District Operations 42
Goals and Objectives 42
Custodial Operations 42
  Administration by Principal 42
  Administration Through Shared Responsibility 43
Custodial Staffing 45
Custodial Work Load Formulas 45
  CASBO Work Load Formula 46
  San Joaquin Time-Task Frequency Formula 46
  Denver Custodial Formula 47
  Area Allotment per Person-Hour Formula 47
Characteristics of an Effective Custodian 47
Custodial Services for Students and Staff 48
The Custodial Schedule 48
Grounds Operations 50
  Goals and Objectives 50
  Administrative Lines of Authority 50
  Staffing and Work Load Formulas 52
  Relations with Students, Staff, and Community 53
  Facilities, Equipment, and Supplies 53

Chapter 5. Managing Other School District Responsibilities 58
Proper Use of School Facilities 58
  General Guidelines 58

  - Important Terms 58
  - Priority for Use 59
  - Requests for Use 59
  - Use of Athletic Facilities 59
- Management and Conservation of Energy 59
  - Recommendations to Save Energy 60
  - Energy Management System 62
  - Conservation of Lighting 62
- Control of Hazardous Materials 63
  - Exposure to Asbestos 64
  - Protection from Asbestos 64
  - Polychlorinated Biphenyls (PCB) 67
- Control of Pests 68
  - Laws and Regulations 68
  - Pest Control Safety 68
  - Pests in and Around Schools 69
- School Safety and Security 69
  - Security Alarm Systems 70
  - Fire Protection 70
  - Safety Rules and Regulations 70
- Access for the Handicapped 70

Appendixes

- Appendix A: Selected Legal References 73
- Appendix B: Time Schedules 74
  - The CASBO Formula 74
  - San Joaquin Task-Time Frequency Formula 75
  - Denver Custodial Formula 80
  - Area Allotment per Person-Hour Formula 82
- Appendix C: Evaluating a School District's Custodial Program 83

List of Figures

Figures *Page*

1 Line-and-staff pattern of maintenance and operations for an elementary school district that operates one preschool, two special education units, and ten schools and has an a.d.a. of 6,700 6

2 Line-and-staff pattern of maintenance and operations for a unified school district that operates four high schools, four middle schools, and 17 elementary schools and has an a.d.a. of 16,500 7

3 Line-and-staff pattern of maintenance and operations for a unified school district that operates 80 school facilities and has an a.d.a. of 45,200 8

4 Line-and-staff pattern of maintenance and operations for a joint union high school district operating seven high schools with an a.d.a. of 10,500 9

5 Formula for determining the 100 percent replacement value of the district's buildings 16

6 Formula for establishing an annual reserve fund for repair of buildings 16

7 Formula for establishing annual needs for repair of equipment 17

8 Formula for establishing annual reserve needed for upkeep of grounds 17

9 Formula for establishing annual reserve needed for replacement of equipment 17

10 Formula for determining the total annual depreciation reserve fund needed for all maintenance 17

11 Formula for determining maintenance funds to be included within revenue limits and reserves to be raised 17
12 Major events in construction and educational program planning 21
13 Flowchart illustrating steps in developing a maintenance management program ... 27
14 Key elements of an engineering management program 30
15 Economic graph for determining the frequency of preventive maintenance 34
16 Flowchart illustrating maintenance work orders 39
17 Unified school district custodial operations organization shared responsibility system 44
18 Responsibilities for maintenance and operations in a medium-sized school district 51
19 Grounds branch functional organization 53
20 Grounds maintenance cost analysis procedures 54

Foreword

Approximately four million students now attend California public schools, and approximately 500,000 new students will enter our schools during the next five years. Consequently, we must consider two important questions about the condition of our school facilities: Are the students who now attend our schools receiving instruction in safe, adequate, and well-maintained facilities? And will our future students have such facilities in which to learn?

Many of our educational reform efforts will be in vain if we cannot answer these questions positively. We cannot offer rigorous courses in science if high schools do not have the appropriate laboratory facilities. We cannot expect our children to learn basic skills in reading and writing if they are taught in overcrowded classrooms or in inadequate facilities. Many of our present facilities need rehabilitation or major maintenance work. In addition, many new classrooms and other facilities will be needed during the next five years to accommodate our new students. Clearly, our present facilities must be properly maintained and efficiently operated, and new facilities must be constructed.

During 1985 the Department of Education worked with the Legislature and other groups, including the California Association of School Business Officials (CASBO), to address the need for new and improved school facilities. As a result, we are on the way toward making major changes in the way we design, construct, maintain, and operate school facilities. This handbook, *Administration of Maintenance and Operations in California School Districts: A Handbook for School Administrators and Governing Boards,* can serve as a guide to those who maintain and operate our schools as well as to those who wish to better understand how an effective maintenance and operations program contributes to the comfort, safety, efficiency, and well-being of all those who use school facilities. These elements are essential to meet our goal of educational excellence.

Bill Honig

Superintendent of Public Instruction

Preface

School district maintenance and operations constitute one of the major responsibilities of governing boards and school administrators. Maintaining and operating school facilities in an orderly manner is an important part of efficient school administration and a legal requirement as well.

For a number of years, the California Association of School Business Officials (CASBO) has been cooperating with the State Department of Education in preparing several manuals for school districts and offices of county superintendents of schools. One of these manuals, *Administration of Maintenance and Operations Departments in California School Districts,* was published by the Department in 1969. It provided basic information concerning the administration of the maintenance and operations functions of school districts in California.

The new manual is entitled *Administration of Maintenance and Operations in California School Districts: A Handbook for School Administrators and Governing Boards.* It contains information that administrators of maintenance and operations departments in California schools can use in planning and scheduling support services. The manual is intended to be used by members of governing boards, district superintendents, business officials, directors and supervisors of maintenance and operations, and other interested school personnel and community members.

The overall purposes of systematically planning and scheduling school facility support services are to safeguard capital investment, increase the useful life of the facility, promote health and safety, and provide an appropriate environment for teachers and students.

This handbook is organized into four basic units. The first unit, Chapter 1, is designed to help members of school district governing boards establish board policies, regulations, and procedures. Topics covered include facility management, facility standards, personnel policies, selection of equipment and supplies, facility design, and site utilization.

The second unit, Chapter 2, outlines current practices in the field so that the director of maintenance and operations will be able to implement the policies of the governing board. This chapter includes discussions of the design and implementation of an organizational plan; personnel management; development and presentation of the budget; acquisition of facilities, equipment, and supplies; monitoring of the planning, constructing, and equipping of facilities; and evaluating the effectiveness of the maintenance and operations program.

The third unit, Chapters 3 and 4, is concerned with the functions of maintenance and operations. Maintenance includes school building and equipment maintenance; operations includes custodial maintenance services and grounds maintenance services. This unit suggests organizational procedures that should lead to programmed budgeting, a systematic management program, and the efficient utilization of personnel. This unit also includes a discussion of the current status of school maintenance in light of inflation, declining enrollments, reduced revenues, and demands for increased spending in other areas of the educational program.

The fourth unit, Chapter 5, contains discussions of important maintenance and operations subjects not included in the first handbook. Topics include the use of school facilities, energy management, control of hazardous materials, pest control, school safety and security, and access for the handicapped.

Material contained in the appendixes includes selected legal requirements, time schedules, and questions related to the evaluation of a district's custodial program. The information in this handbook will be helpful in evaluating the operating effectiveness and efficiency of the maintenance and operations department, determining budget needs, and establishing long-range plans for the maintenance and operations program.

ROBERT W. LAWRENCE
Deputy Superintendent
for Field Services

ERNEST LEHR
Director, School Facilities
and Transportation Division

Acknowledgments*

The material for this handbook was gathered from a wide variety of sources by Helen Sullivan Cease, Coordinator of Special Services, Centralia School District. Material extracted from the original 1969 handbook was updated. Some technical and nontechnical maintenance and operations procedures were adopted from the California Association of School Business Officials' (CASBO) research publications. Other material was gathered from various school districts. Many school officials, whose names are listed below, helped to compile this handbook by providing information on new concepts, procedures, and techniques in school business management.

Maintenance and Operations Research and Development Committee Members

Onis C. Lentz, State Chairperson
Director of Operations
Burbank Unified School District

Gary Boender, Assistant State Chairperson
Director of Engineering, Maintenance, Operations, and Transportation
Newark Unified School District

Don Jackson, Chairperson, Northern Section
Coordinator of Buildings and Grounds
Oakland Unified School District

William Rohl, Chairperson, Sacramento Section
Director of Maintenance and Operations
Placer Union High School District

Rex McCallister, Chairperson, Central Section
Director of Operational Programs
Visalia Unified School District

Bill E. Morton, Chairperson, Southern Section
Director of Facilities
Lancaster Elementary School District

David Dow, Chairperson, San Diego-Imperial Section
Facilities Inspector for Maintenance and Operations
Chula Vista City Elementary School District

J. D. (Dave) Smith, Committee Member-at-Large
Director of Facilities and Services
Irvine Unified School District

Chuck J. Restivo, Community College Representative
Director of Facilities and Operations
Santa Barbara City College

Henry J. Heydt, Liaison to the Committee
Coordinator, School Facilities Planning Unit
State Department of Education

Other Contributors

Robert Bailey
Director of Maintenance and Operations (Retired)
Huntington Beach Union High School District

Claude G. Barnes
Supervisor of Maintenance and Operations (Retired)
Office of the Kern County Superintendent of Schools

Larry Bourdet (Deceased)
Director of Buildings and Grounds
Santa Rosa Junior College

Richard Buckman
Supervisor of Building Services (Retired)
Torrance Unified School District

Earl Carpenter
Director of Public Safety
Huntington Beach Union High School District

Paul Coyle
Director of Maintenance, Facilities, and Operations
San Juan Unified School District, Sacramento

Richard Ehrhardt
Director of Planning
San Juan Unified School District, Sacramento

Clyde Foster (Deceased)
Director of Maintenance, Operations, and Transportation, Santee Elementary School District

Mike Kovalchik
Director of Maintenance and Operations
San Juan Unified School District, Sacramento

Rowley H. Lascelles
Director of Buildings and Grounds
San Luis Coastal Unified School District

---

*The titles and locations given for the persons acknowledged here were current at the time this manual was prepared.

Richard W. Maxfield
Assistant to Business Manager
Los Angeles Unified School District

Henry Needham
Assistant Director of Maintenance, Facilities, and Operations
Simi Valley Unified School District

Gerald L. Porter
Director of Maintenance and Operations (Retired)
Sierra College, Rocklin

Richard Rector
Director of Area Maintenance
Los Angeles Unified School District

Edwin O. Reed
Facilities Director
Chula Vista City Elementary School District

John C. Ribbins
Director of Maintenance and Operations
Cerritos Community College, Norwalk

Dale Wilson
Director of Facilities and Planning
Downey Unified School District

William Woodard
Director of Maintenance and Operations (Retired)
Chula Vista City Elementary School District

Technical Consultants

Robert Bailey
Gary Boender
Richard Buckman
Paul Coyle
Don Jackson
Onis C. Lentz
Rex McCallister
Bill Morton
Richard Rector
Edwin Reed
J. D. (Dave) Smith
Dale Wilson

Chapter 1

Responsibilities of the Governing Board

The school district governing board's responsibility for the maintenance and operations of school facilities is outlined by law and established by prudent practice and sound business judgment. Briefly, the governing board is responsible for (1) maintaining the buildings in a condition adequate to support the educational program and reasonably close to their original appearance and quality; (2) adequately equipping the buildings to provide the services for which the buildings were planned; and (3) modifying the buildings when necessary to accommodate new technologies in education. The governing board, then, must keep the facilities in continuous operation and in excellent condition through repair, replacement of elements, restoration, renovation, or other necessary measures. Excerpts from the California *Education Code* and the *California Administrative Code, Title 5, Education*, concerning some of the legal requirements and responsibilities of the board appear in Appendix A.

In accordance with the legal responsibilities, the governing board should also establish a philosophy and policy to guide the administration of the maintenance and operations function. Areas in which such guidance is appropriate are facility management; facility standards; personnel policies; selection of equipment and supplies; facility design; and site utilization.

Facility Management

The governing board is by law responsible for carrying out those functions required to maintain school facilities properly. One initial requirement is to establish a well-defined facility management policy. Prior to establishing this policy, the governing board should develop a philosophy of facility management that would encompass the goals of the program. This philosophy statement should be written and should be adopted by the school board. The philosophical goals should include provisions for promoting health and safety, operating facilities economically, protecting capital investments, correcting obsolescence in structures, and promoting school and community pride.

Promoting Health and Safety

In providing a school environment that is conducive to good health and favorable conditions for learning, governing board members are obligated to maintain safe and healthful school facilities. Parents who by law are required to send their children to school and employees whose work requires them to be on school premises have every right to expect safe buildings, grounds, and equipment. School safety standards assist in the prevention of accidents or injury to health from fire, mechanical and electrical malfunctions, natural disasters, and avoidable hazards.

Of all school hazards, fire is perhaps the greatest single cause of loss of life and property. School fires occur at an alarming rate despite safety programs. Other potential hazards include highly waxed and polished floors and stair treads, clogged air filters, combustibles and other materials inappropriately stored, improper layout and surfacing of playground areas, and poorly planned access roads and service drives. Yet, with the adoption of custodial and maintenance standards by governing boards, these hazards can be minimized or removed entirely.

Operating Facilities Economically

Economical maintenance and operations of school plant facilities should start on the drawing board of the school architect and continue through construction, operation, and disposal of the property. In many areas school facilities that were constructed to accommodate the peak enrollments of earlier years now provide excess student capacity. When enrollments decline, the cost of operating and maintaining school facilities does not automatically decline at the same rate. The need for maintenance, custodial and grounds work, insurance, and debt servicing tends to remain substantially unchanged. As a result, costs per student rise and fiscal efficiency declines. Therefore, the optimum loading of school facilities is a necessary element of efficient district management. One aim of a maintenance and operations program that has been adopted by the governing board is to effect operating economies by providing maximum service at the lowest possible cost.

Natural deterioration compounds the problem of maintaining more schools than student enrollment dictates. Older buildings are often more difficult and expensive to maintain and operate safely and must be updated and improved to save on labor and utilities.

In many older buildings time-saving necessities, such as adequate storage space for custodial supplies and equipment, were not included in the original building plans. As a result, these and other necessities will need to be devised and included in the overall school facilities improvement program. Time consumed by custodians in walking to remote parts of the building to gather and replace tools and supplies can be minimized by providing convenient storage areas. Labor accounts for more than 80 percent of the total cost of cleaning operations. Updating equipment and facilities can increase custodial efficiency and significantly reduce total labor costs. The cost of maintaining and operating school facilities increases exponentially year by year as deterioration increases. Establishing and implementing an adequate facilities maintenance and operations program can contribute to long-term cost effectiveness and economy in the educational process.

In addition, the inefficient use of energy due to improperly maintained or obsolete equipment and facilities wastes available resources. Often, awareness of problem areas is the first step in increased operating efficiency.

Protecting Capital Investments

The governing board determines the philosophical basis for protecting the significant capital investment that school facilities represent to the community. Generally, the board members will elect to maintain school buildings and equipment to conform to community standards. Policies that provide for adequate maintenance and operations programs can retard deterioration, reduce fire hazards, minimize the need for extensive repairs, extend the life of facilities and equipment, and protect the investment the community has made in facilities and sites.

Maintenance applies to all parts of a facility, including equipment and grounds. In some building areas, wear and tear are more noticeable than in others, and the need for maintenance in these areas is more evident. Care of unobtrusive areas is more likely to be put off. Such deferred maintenance or maintenance neglect leads to more rapid deterioration and often makes early replacement necessary.

Correcting Obsolescence in Structures

An alternative to constructing new facilities is correcting obsolescence in existing structures. The decision to build new facilities or to correct obsolescence should be part of the governing board's policy for the orderly solution to the district's housing problems. Many facilities classified as obsolete are too structurally sound to be abandoned. In most cases these structures can be improved to meet the educational needs of the district. Improvement can be accomplished through modernization, rehabilitation, or remodeling.

Modernization. Through modernization, buildings are adapted to the changing needs of educational and community programs. Adaptations to newer concepts of student services may include improving science laboratory facilities or replacing obsolete equipment.

Rehabilitation. As defined in this manual, rehabilitation is the general overhauling of a major part of or an entire building. Rehabilitation may involve renovation, replacement of parts, or remodeling.

Remodeling. A change made in structure, such as removing or relocating partitions, altering roof structure, lowering ceiling heights, adding structural members for strength, or changing exterior walls, is referred to as remodeling.

Correcting obsolescence in facilities is not a maintenance function. However, it will reduce maintenance costs. Any plans by the district to correct obsolescence should be developed in conjunction with the director of maintenance and operations. Both modernization and rehabilitation may require remodeling. An architect should be consulted any time an older building is to be remodeled.

Promoting School and Community Pride

Promoting school and community pride in school facilities through a maintenance program has far greater significance than just pleasing the public. A well-maintained school facility promotes a favorable community attitude and helps develop respect for school property. In addition, a well-kept school contributes to the health, happiness, and character development of the students. Inadequate school maintenance frequently breeds student contempt for the property. This contempt is often expressed in misuse of restrooms; littering; defacement of walls, furniture, and equipment; and through other forms of vandalism. On the other hand, good maintenance can create an atmosphere in which students, staff members, parents, citizens, and the governing board members can take pride in their schools. A good maintenance program has implications for improved public relations as well as for fiscal management. The public is gratified to know that the governing board has developed policies that preserve school property. This positive public and student attitude is often demonstrated by financial support and by the pride with which the facilities are shown to visitors.

Facility Standards

When establishing policies for a new maintenance and operations program or when evaluating an existing program, the governing board and the school administrators should answer the following questions:

- Do governing board policies include standards for the necessary services?
- Is meeting the needs of the district's educational

program the primary objective of the district's maintenance and operations program?

- Does the building program provide energy-efficient sites with adequate storage space, work stations, and other necessary service facilities?
- Does the building program recognize the importance of selecting material and equipment that contribute to efficient custodial operations as well as to low maintenance costs?
- When district standards for furnishing classrooms are established, does allocated space facilitate custodial work within the classroom?
- Does the district budget provide the necessary funds to carry on a detailed, carefully planned program of maintenance and operations services?
- Do annual budgets provide adequately for depreciation and replacement as well as for original purchases of maintenance and operations equipment?
- Have the maintenance and operations service functions been included and have personnel been sufficiently trained and involved in developing and operating the district's safety and security program?
- Does the district's educational program encourage students to respect school facilities?
- Are the written rules and regulations regarding the use of school facilities by community groups effectively enforced so as not to cause undue custodial problems?

These ten questions, thoughtfully considered by the governing board members, can be a starting point toward maintaining the district's facilities.

Standards for appearance and performance of school facilities reflect the governing board's interpretation of the wishes of the taxpaying community regarding the schools. The board is responsible for formulating policy definitions that clarify the standards necessary to design, construct, equip, and maintain and operate the physical plant; financing these operations; and assisting in and following up the implementation of the policies.

Standards of appearance and performance should not be confused with work performance standards. Although work performance standards are helpful in implementing the board's policy and standards, they are not the same as standards of appearance. A sample of a standard of appearance and performance that has been prepared by a governing board follows:

> Our school facilities shall be maintained at a level of support required to sustain a high quality educational program within the district. Through adequate maintenance school district facilities are able to provide functional, safe, healthy, and comfortable environments for the educational process. Appearance and support standards should create an image of effectiveness and efficiency. They should ensure cost effective maintenance and long building life. They should promote both student and community pride and should protect the taxpayer's investment.

Such a policy can be implemented through various methods. These include appropriate functional organization, personnel staffing procedures and techniques, shop facilities, equipment and supplies, and overall coordination and management.

Personnel Policies

Once a framework for facility standards has been established, the governing board is responsible for establishing personnel policies involving the maintenance and operations program. In general, the person directly responsible for executing district policy and for establishing divisional personnel policies is the director of maintenance and operations, who works in coordination with the district manager of personnel.

Because maintenance and operations are closely related functions, one director should administer both areas. The director should be responsible for submitting personnel policies, including those concerning employment, to the superintendent and to the governing board for adoption. The policies should be reviewed yearly by the administrative staff and recommended changes or additions should be submitted to the governing board.

Newly hired staff members should be trained in district policies, procedures, and standards. The governing board should be aware of the need for training and should establish a staff development policy. Training reduces maintenance and operations costs and increases staff efficiency. If staff members are acquainted with new materials, processes, and procedures, they can make a greater contribution to the educational program and to the efficiency of their departments.

The staff development program should be reviewed periodically to ensure that program content is current and consistent with board policy, objectives, and standards.

Selection of Equipment and Supplies

The total cost of the maintenance and operations program can be affected significantly by the quality of equipment and supplies. Although labor constitutes the major portion of the cost of any maintenance and operations activity, cost-effective selection of equipment and materials can reduce short-term and long-term costs. School boards should adopt a consistent policy concerning the type and quality of equipment and materials used. This policy should be used as a guide by the district's business services employees to specify the quality of the materials and supplies to be purchased.

High-quality equipment and supplies contribute to increased productivity; consequently, tasks are completed more efficiently. Greater productivity results in a high level of achievement in the maintenance and operations department. Although equipment and supplies of high quality are initially more expensive than similar products of lesser quality, they often cost the district less in the long run because they help workers to be more productive.

Facility Design and Site Utilization

Maintenance and operations costs are affected by facility design and site utilization. Structures can be designed to meet educational specifications and, at the same time, keep maintenance and energy costs low. The governing board should adopt a policy that encourages the procuring of low-cost sites and the designing and building of long-term, low-cost facilities. The director of maintenance and operations should be a member of the planning committee. Usually, he or she can suggest ways of minimizing maintenance costs. One important way of minimizing costs is through standardized building components. Standardized components simplify maintenance requirements and necessitate buying and storing fewer replacement parts. As a result, maintenance personnel will need to have a thorough understanding of only a few components rather than a superficial knowledge of many.

A common complaint of the operations staff is the lack of storage space for equipment, cleaning materials, and supplies. For example, if some floors are carpeted, additional equipment is needed to clean the carpets; and this equipment must be stored in a designated place. Because storage problems can limit the use of many labor-saving devices in school custodial and grounds departments, architects should make sure that provisions are made for storage of equipment that may be acquired.

Because school and civic pride are enhanced by attractive grounds and landscaping, a well-designed and well-constructed campus for each school should be a desired goal of the administration. Properly designed school campuses provide stimulating educational environments for pupils, staff, and the public. This aesthetic consideration should not be overlooked. Landscaping should be considered an important part of energy conservation. Properly designed landscaping will significantly reduce energy use in facilities. In promoting energy conservation, the governing board should recommend the selection of drought-resistant and low-maintenance plants. Trees and shrubs are important because they provide natural cooling. They also shade the ground mass, preventing the storage of heat. School campuses should not be excessively landscaped, however, because increased long-term costs will occur. Prudent judgment in design can result in attractive campuses that are economical to maintain.

An active program of staff development for plant growth management should be established and supported. The sophistication and cost of equipment and chemicals and their usage mandate in-service training for staff members.

Finally, playground equipment on school grounds should be carefully designed so that schoolchildren will not be injured when using it.

Chapter 2

Implementing the Governing Board's Policies

Approximately 13 percent of a school district's income is allocated to maintaining and operating facilities. The person who directs the district's maintenance and operations department has to make certain that these funds are spent wisely. The two essential components that control expenditures are (1) the maintenance and operations department's organizational structure; and (2) the department's administrative practices.

Larger school districts need explicit lines of communication so that important information can be forwarded quickly to the maintenance and operations department. Smaller districts can operate without such detailed communication channels. In either case, the department should develop detailed procedures to ensure that the department operates successfully.

Implementation of the procedures established by the department depends on the department's organizational structure, which should facilitate the systematic and practical development of required procedures.

School facility maintenance and operations involves three major areas. All three areas are complementary and mutually supportive of the total educational program. Descriptions of these three areas follow:

1. *Maintenance of buildings, building equipment, and grounds installations and equipment.* This function involves operating and maintaining the facilities' mechanical, electrical, and structural systems. The air-conditioning and restroom equipment, the plumbing, the lighting system and other electrical apparatus, roofs and walls, and the sprinkler irrigation system are all components of these mechanical, electrical, and structural systems.
2. *Operation of custodial maintenance services.* This function involves cleaning, sanitizing, and vacuuming carpets; cleaning hard surface floors; disposing of trash; and performing other housekeeping tasks required to maintain a clean, sanitary, and comfortable environment that supports the educational program.
3. *Operations of grounds (organic) maintenance.* This function involves providing neat, clean, attractive, safe, and functional ground facilities that support the educational program. This function includes maintaining playground areas, athletic facilities, turf areas, ground covers, and ornamental plantings.

Implementing the Board's Policies

The director of maintenance and operations is responsible for carrying out the total maintenance and operations program and must formulate administrative practices and procedures that will make it possible to achieve the policies established by the governing board. In most instances these practices and procedures are developed with the help of the assistant superintendent for business services. The administrative procedures formulated, as well as the recommendations made for the department, are submitted for approval to the superintendent and the governing board.

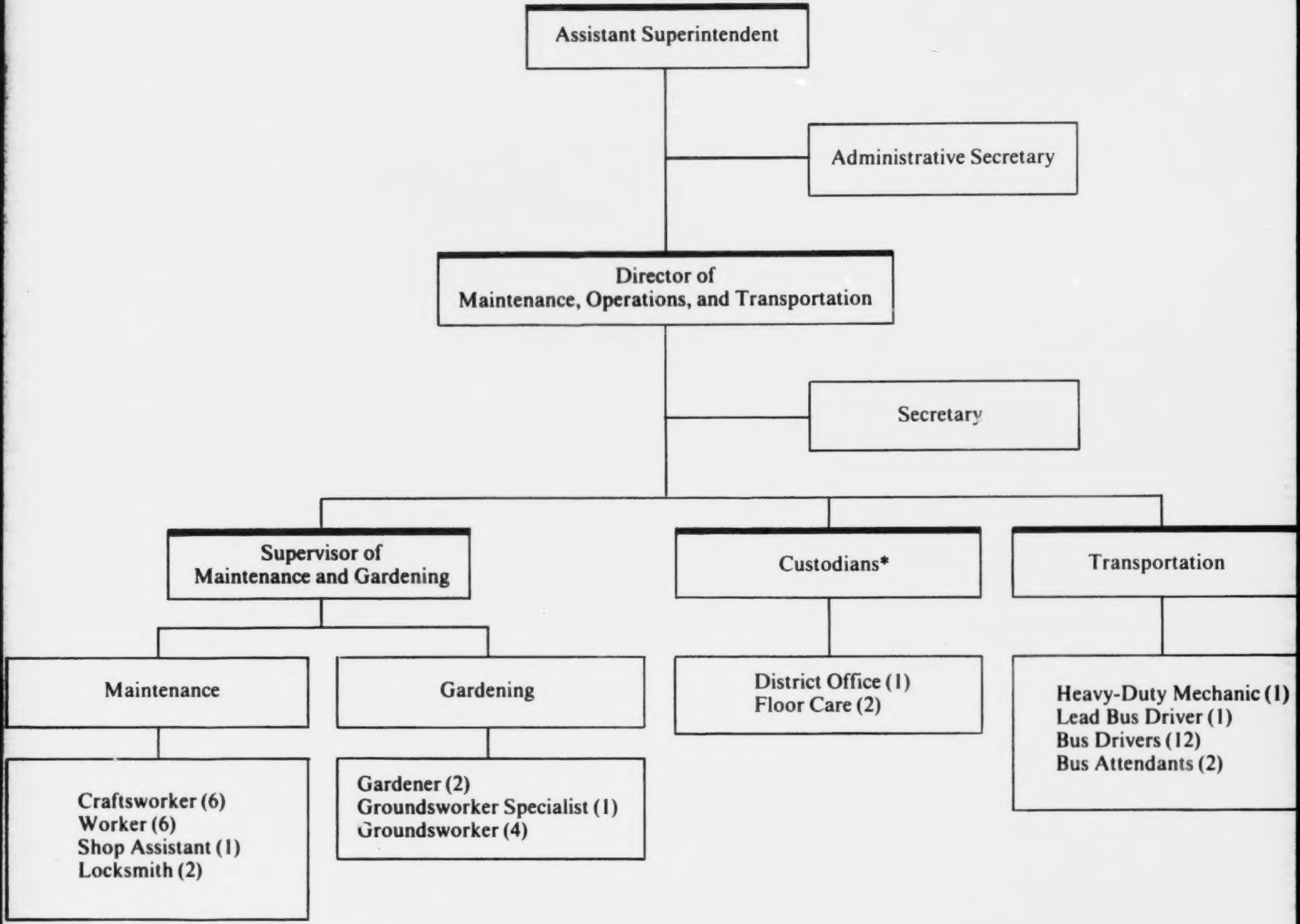
The director of maintenance and operations is responsible for:

- Designing and implementing a functional organizational plan
- Exercising sound personnel management practices
- Developing and presenting a budget
- Purchasing facilities, equipment, and supplies
- Monitoring the planning, constructing, and equipping of facilities
- Evaluating the effectiveness of the maintenance and operations program

Designing and Implementing an Organizational Plan

The line and staff organizational pattern is frequently used to establish a sound functional organization. This pattern retains the undivided authority and full responsibility given to the director in a line-type pattern of organization but includes the advice and assistance of staff personnel. It also (1) makes possible the addition of new activities without interruption to the regular operating procedure; and (2) makes use of the division of labor and introduces the staff specialist into the organizational pattern. Cooperation and coordination between departments can be a product of this type of organization.

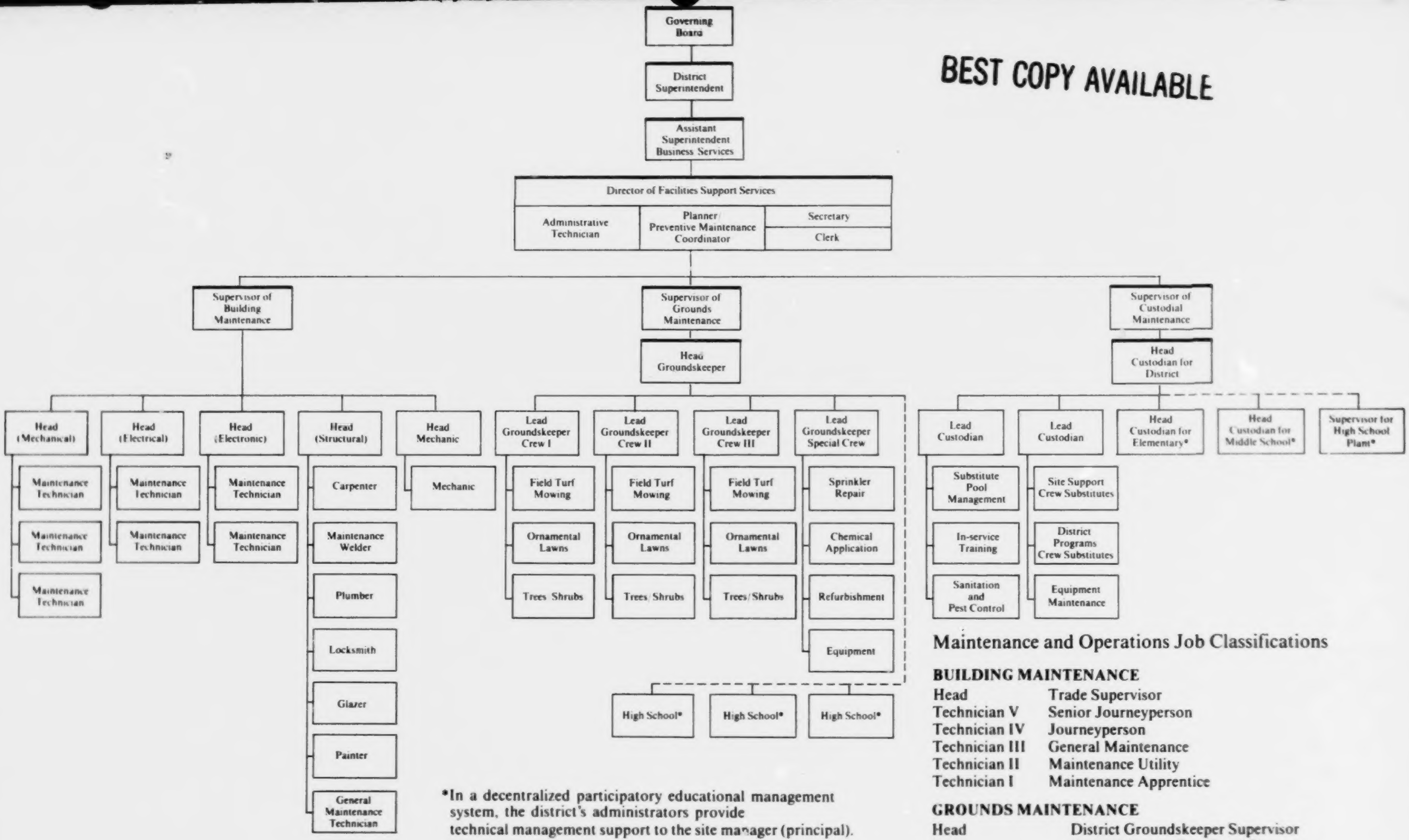
Figures 1 through 4 depict the wide-ranging organizational patterns that can be used in various school districts. Each district should develop its own organizational chart so that all employees understand the lines of authority for supervision and evaluation.


Assistant Superintendent
Administrative Secretary
Director of Maintenance, Operations, and Transportation
Secretary
Supervisor of Maintenance and Gardening
Custodians*
Transportation
Maintenance
Gardening
District Office (1)
Floor Care (2)
Heavy-Duty Mechanic (1)
Lead Bus Driver (1)
Bus Drivers (12)
Bus Attendants (2)
Craftsworker (6)
Worker (6)
Shop Assistant (1)
Locksmith (2)
Gardener (2)
Groundsworker Specialist (1)
Groundsworker (4)

*The district is decentralized, and the department handles supplies, equipment replacement, substitution, and technical assistance to the site administrators (principals).

Fig. 1. Line-and-staff pattern of maintenance and operations for an elementary school district that operates one pre-school, two special education units, and ten schools and has an a.d.a. of 6,700

BEST COPY AVAILABLE


Governing Board
District Superintendent
Assistant Superintendent Business Services
Director of Facilities Support Services
Administrative Technician
Planner/Preventive Maintenance Coordinator
Secretary
Clerk
Supervisor of Building Maintenance
Supervisor of Grounds Maintenance
Supervisor of Custodial Maintenance
Head Groundskeeper
Head Custodian for District
Head (Mechanical)
Head (Electrical)
Head (Electronic)
Head (Structural)
Head Mechanic
Lead Groundskeeper Crew I
Lead Groundskeeper Crew II
Lead Groundskeeper Crew III
Lead Groundskeeper Special Crew
Lead Custodian
Lead Custodian
Head Custodian for Elementary*
Head Custodian for Middle School*
Supervisor for High School Plant*
Maintenance Technician
Maintenance Technician
Maintenance Technician
Maintenance Technician
Maintenance Technician
Maintenance Technician
Maintenance Technician
Carpenter
Maintenance Welder
Plumber
Locksmith
Glazer
Painter
General Maintenance Technician
Mechanic
Field Turf Mowing
Ornamental Lawns
Trees/Shrubs
Field Turf Mowing
Ornamental Lawns
Trees/Shrubs
Field Turf Mowing
Ornamental Lawns
Trees/Shrubs
Sprinkler Repair
Chemical Application
Refurbishment
Equipment
High School*
High School*
High School*
Substitute Pool Management
In-service Training
Sanitation and Pest Control
Site Support Crew Substitutes
District Programs Crew Substitutes
Equipment Maintenance

*In a decentralized participatory educational management system, the district's administrators provide technical management support to the site manager (principal).

Fig. 2. Line-and-staff pattern of maintenance and operations for a unified school district that operates four high schools, four middle schools, and 17 elementary schools and has an a.d.a. of 16,500

Maintenance and Operations Job Classifications

BUILDING MAINTENANCE

Head	Trade Supervisor
Technician V	Senior Journeyperson
Technician IV	Journeyperson
Technician III	General Maintenance
Technician II	Maintenance Utility
Technician I	Maintenance Apprentice

GROUNDS MAINTENANCE

Head	District Groundskeeper Supervisor
Lead	Groundskeeper Crew Lead Person
Groundskeeper IV	Special Function Groundskeeper (chemical spray and so forth)
Groundskeeper III	Senior Groundskeeper
Groundskeeper II	Groundskeeper
Groundskeeper I	Entry-Level Groundskeeper Trainee

CUSTODIAL MAINTENANCE

Head	District Custodial Supervisor
Lead	High School Lead Person
Custodian IV	Head Custodian, Middle School
Custodian III	Head Custodian, Elementary
Custodian II	Night Custodian
Custodian I	Entry-Level Night Custodian Trainee

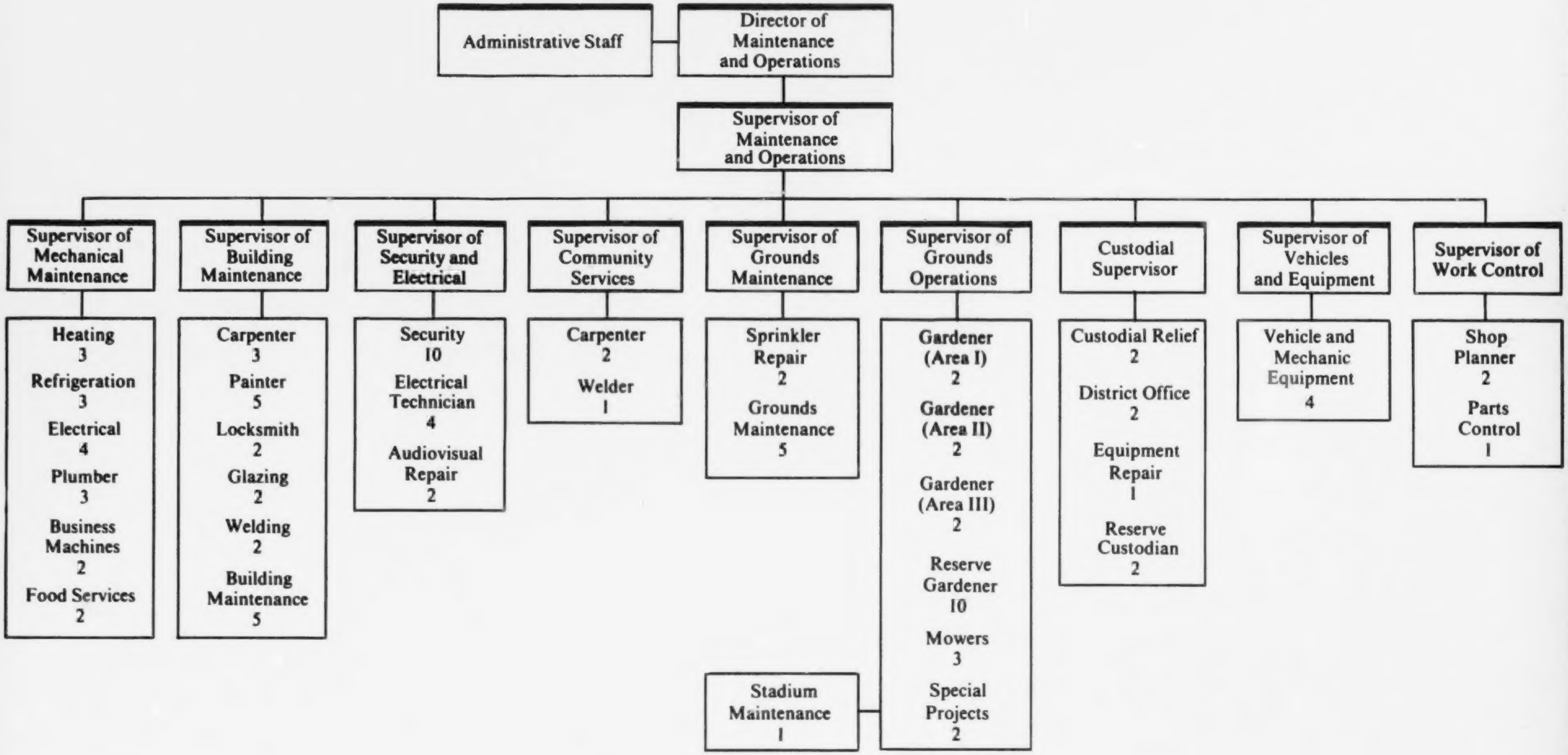

Administrative Staff
Director of Maintenance and Operations
Supervisor of Maintenance and Operations
Supervisor of Mechanical Maintenance
Heating 3
Refrigeration 3
Electrical 4
Plumber 3
Business Machines 2
Food Services 2
Supervisor of Building Maintenance
Carpenter 3
Painter 5
Locksmith 2
Glazing 2
Welding 2
Building Maintenance 5
Supervisor of Security and Electrical
Security 10
Electrical Technician 4
Audiovisual Repair 2
Supervisor of Community Services
Carpenter 2
Welder 1
Supervisor of Grounds Maintenance
Sprinkler Repair 2
Grounds Maintenance 5
Supervisor of Grounds Operations
Gardener (Area I) 2
Gardener (Area II) 2
Gardener (Area III) 2
Reserve Gardener 10
Mowers 3
Special Projects 2
Stadium Maintenance 1
Custodial Supervisor
Custodial Relief 2
District Office 2
Equipment Repair 1
Reserve Custodian 2
Supervisor of Vehicles and Equipment
Vehicle and Mechanic Equipment 4
Supervisor of Work Control
Shop Planner 2
Parts Control 1

Fig. 3. Line-and-staff pattern of maintenance and operations for a unified school district that operates 80 school facilities and has an a.d.a. of 45,200

BEST COPY AVAILABLE

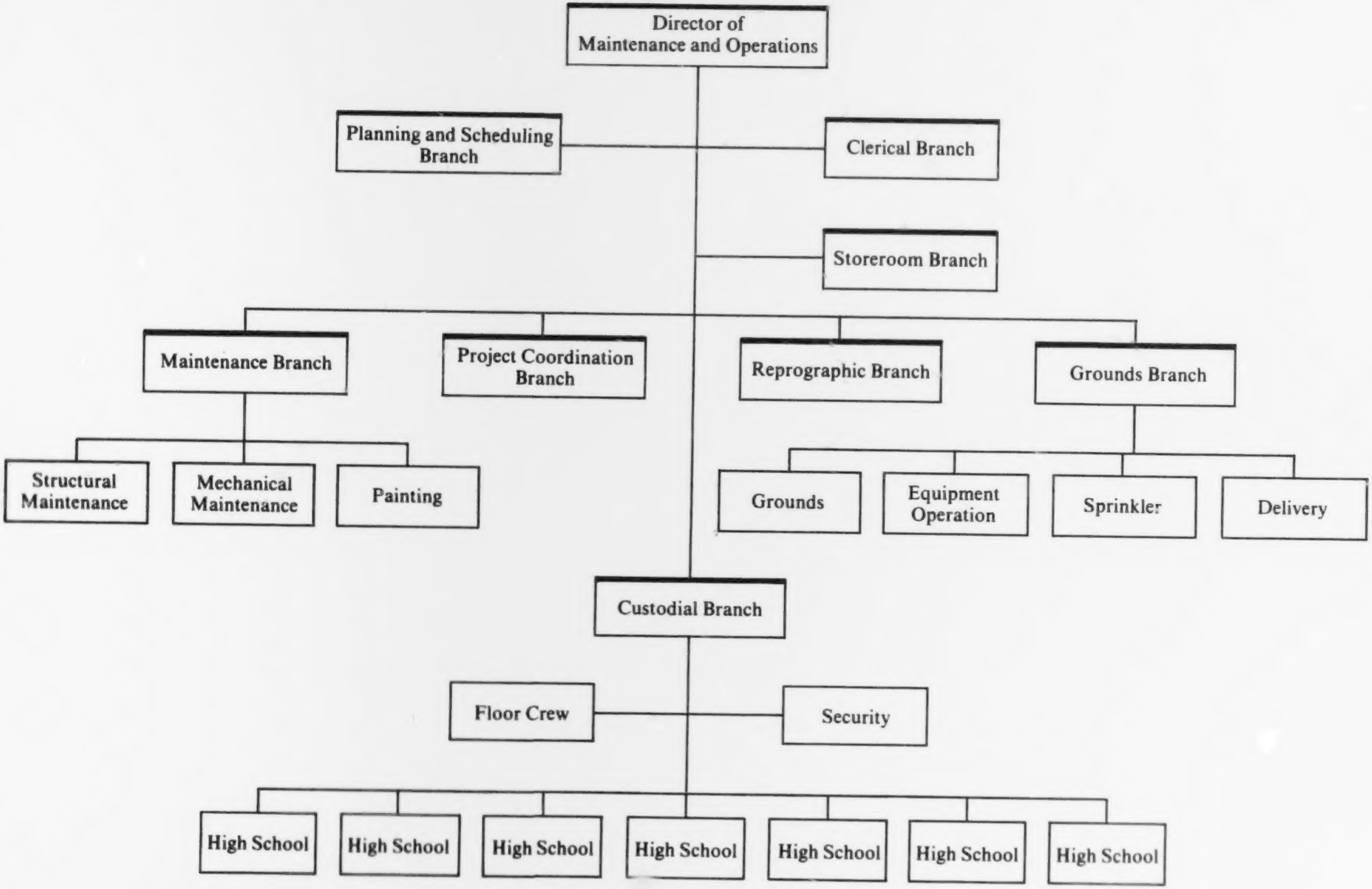

Director of Maintenance and Operations
Planning and Scheduling Branch
Clerical Branch
Storeroom Branch
Maintenance Branch
Project Coordination Branch
Reprographic Branch
Grounds Branch
Structural Maintenance
Mechanical Maintenance
Painting
Grounds
Equipment Operation
Sprinkler
Delivery
Custodial Branch
Floor Crew
Security
High School
High School
High School
High School
High School
High School
High School

Fig. 4. **Line-and-staff pattern of maintenance and operations for a joint union high school district operating seven high schools with an a.d.a. of 10,500**

Because most district maintenance personnel have districtwide responsibilities, the supervisor of maintenance should have direct line authority over all maintenance employees. The supervisor should provide liaison between site administrators and the business division concerning budgeting requests for services and equipment. If maintenance responsibilities also include the care and upkeep of school grounds, the supervisor also should direct the work of these staff members. If gardening and site work are regarded as a separate function and gardeners are assigned to districtwide crews rather than to individual sites, the supervisor of grounds will operate parallel to the maintenance supervisor.

Some districts assign full-time maintenance personnel to district high schools. If this type of arrangement is best for the district, the responsibilities of assigned maintenance personnel should be clearly defined.

The job description for each grounds employee should clearly indicate the line of supervision. Most gardening is now done by crews that operate under a central supervisor. Large high schools may be assigned a full-time gardener. If so, the supervisory responsibility must be defined at the district administration level.

The operations phase of facility management includes those daily or frequent and regular services and activities necessary to keep the physical plant open and usable. Keeping a heating plant operational, cleaning classrooms, and washing windows are operations functions. Because of the nature of this work, custodial staff members usually are assigned to specific sites and buildings. If because of the district's philosophy the building principal is assigned as site administrator, he or she should have line authority over the custodial staff members. Certain other staff services—including technical supervision and budget recommendations—should be provided by the supervisor of operations.

The organizational structure for the entire district, including the maintenance and operations department, should be established and approved by the governing board. The organizational structure that is finally established will have a significant impact on the productivity of all personnel who are working to achieve the goals and objectives of the board.

Sound business practices dictate that the district organizational structure be clearly defined. In addition, each job should be clearly defined. Employees should understand their role and function within the total organization. Organizational levels of authority should be kept to a minimum, and each employee should be responsible to only one supervisor. Staffing ratios of supervisors to workers should be appropriate. Consideration should be given to those functions that should be performed by district staff members and those that should be performed by contract personnel.

Exercising Sound Personnel Management

Salaries for maintenance and operations personnel could equal approximately 80 percent of the total departmental budget. Therefore, the proper selection and management of personnel are the primary responsibility of the director of maintenance and operations. To be most effective when selecting and managing personnel, the director of maintenance and operations should consider all categories of personnel management. A discussion of each category follows.

Adequate Staffing

The maintenance and operations department requires an adequate number of staff members to be an effective support system for the instructional program. In times of financial crisis, governing boards may attempt to economize by cutting either personnel or supplies. This practice can result in greater long-term expenditures and a reduction of funds available for instruction. A cutback in personnel may result in excessive overtime for the remaining staff or in deferred maintenance and the eventual collapse of the planned maintenance program.

Savings in the maintenance and operations budget can be better accomplished through the more effective use of personnel. Increased efficiency can result in significant dollar savings. Staff members who are trained, are competent, and are properly equipped should be efficient. However, even the best worker is not productive 100 percent of the time. Every job has nonproductive time. For example, time workers spend getting instructions, picking up supplies, traveling between jobs, and being on standby or on break makes up approximately 40 percent of the normal work day. Therefore, a 60 percent production factor or effective time factor may be used in budgeting personnel time if a more exact estimate is not available from district records. A reduction in unproductive time is, of course, a worthy goal for the maintenance and operations department.

Job Descriptions

Each position within the maintenance and operations department should be supported by an accurately written job description. At least once a year, the job description of each position in the maintenance and operations department should be evaluated and correlated with the needs of the district. As new equipment and techniques are introduced into the district, the job description should be updated to conform with actual practice. Each employee's position should be reviewed also to ensure that each employee is performing the job outlined in the job description. This review should be done on a regular basis.

Recruitment

Procedures for attracting qualified applicants to fill a position vary according to the size and location of the school district. One method of attracting qualified applicants is to develop clearly written job vacancy notices and post them in state and local employment and personnel offices and in other school facilities. These notices should include a general description of the community, the district, and school programs. In addition, the description should list the job responsibilities and qualifications, including educational and experience requirements. Application and selection procedures also should be clearly stated. The salary range, number of work days, and an overview of fringe benefits will be helpful in attracting qualified candidates.

Another effective method of recruiting qualified applicants is to advertise in the employment sections of local newspapers. If funds are limited, it is cost effective to advertise once a week in the Sunday edition of the local newspaper with the largest circulation.

As a public service local radio stations may offer free radio time for announcing job vacancies. Another resource that may help in recruiting qualified personnel is local business and industry. The personnel director and the maintenance and operations director should become acquainted with their counterparts in business and industry. To do so not only promotes improved community relations but also may result in cooperative efforts to refer qualified candidates when openings exist.

Selection and Assignment

After the governing board has established the type of organizational structure to be used, the selection of competent personnel to implement the program's goals and objectives is the next critical step. The screening and selection of employees should be considered an integral part of overall organizational planning. The policies for utilizing human resources should be based on the district's long-term needs and goals.

To predict future staffing needs and to gain an understanding of the interdependence between personnel policies and personnel flow, the personnel department should analyze past patterns of personnel flow. Policies and procedures then can be established to provide the framework for employment decisions and should be reviewed periodically to determine whether they should be revised.

Ideally, the policies and procedures used in hiring personnel will facilitate a mutual matching of jobs and employees. Defining the characteristics an employee needs to perform the job successfully can help to determine the best qualified applicant. Current state and federal legislation requires that an organization be able to prove the job-relatedness of job specifications and all information gathered during selection procedures. Therefore, the personnel department should decide on qualities that are observable and measurable.

After initial screening, four or five candidates should be selected for each position to be filled. Preliminary screening can be accomplished through brief interviews and completed application forms. Information gathered should provide verifiable biographical information and answers to questions about goals and interests. This information will also provide a sample of the applicant's written communication skills. Although written references can sometimes be helpful, they are usually positive and vague. A written reference should be followed up with a telephone call or personal visit to the applicant's current or former place of employment.

Once an applicant has met minimum requirements, the decision to employ him or her is usually made after a personal interview. The purpose of the interview is to determine whether the organization wants to hire the applicant and whether the applicant wants to be part of the organization. The latter purpose is often forgotten but is especially important when applicants are in great demand. Interviews should be conducted jointly by personnel office staff members who are adept at judging minimal qualifications and personality factors and line managers who can judge the applicant's technical ability and experience.

Some common do's and don'ts of interviewing are as follows:

Do:

- Know the job description, job specification, and qualifications.
- Complete as much preliminary work as possible by verifying resumes and talking to others familiar with the candidate.
- Interview applicants in a comfortable room without distractions.
- Allow adequate time for the interview.
- Allow the candidate to do most of the talking.
- Make sure that the candidate knows the background of the job and the school district.

Don't:

- Conduct an interview without a strategy.
- Fail to establish rapport.
- Ask poorly phrased questions that suggest the desired response.
- Ask purposeless questions.
- Make biased judgments or jump to conclusions.
- Become antagonistic or inhibit the applicant.

- Fail to follow up leads.
- Ask questions which go beyond the limits of a proper interview.
- Place too much stress on the applicant.

A structured interview that follows a plan and a combination of a direct and indirect style are recommended. The applicant should be encouraged to talk freely about relevant topics in a directed sequence. The interviewer should limit his or her remarks to 15 to 20 percent of the allotted time and should allow the applicant to use the remainder. The interview should be concluded with an opportunity for the applicant to ask questions. In addition, the candidate should be told when a decision will be made and be given a tour of the facilities.

The final employment decision should be based on an effort to quantify the data gathered from all selection measures. Various interview guides, interview rating forms, and interview reports can be adapted to meet the needs of each district.

Increased accountability in education demands that administrators, teachers, and support staff personnel perform effectively. Improved selection procedures should be developed in relation to those qualities needed for actual on-the-job performance. These criteria can then be used in hiring, supervision, and staff development.

The most pressing task of the maintenance and operations director, in conjunction with the district's personnel department, is to ensure that the maintenance and operations staff is highly qualified. Personnel policies should be upgraded continually to meet the demands of current technological advances in construction, machinery, and electrical equipment. This need is emphasized because the long-range cost of the maintenance and operations program is greater than the initial construction cost of a new facility.

Although in many parts of California the recruitment of skilled employees is difficult, maintenance and operations directors should guard against hiring semiskilled or unskilled employees who do not meet the requirements for the position. Technological advances have introduced increasingly sophisticated mechanical and electrical equipment into school facilities. As a result, maintenance personnel must have an increasingly higher level of skills and training.

A greater demand for skilled employees will result in higher salaries. School districts must be prepared to increase their current salary rates to equal those of business and industry in the local area. It is impossible to economize on salaries for maintenance and operations staff and still expect to attract and keep competent, skilled personnel. Highly competent employees will save the district many times over the additional costs in salary expenditures.

Standards for Job Performance

Work standards, quality levels, completion schedules, and other standards for job performance should be established either formally or informally. If the supervisor establishes predetermined levels of work quality, employees will try to achieve those levels. When the supervisor fails to establish work quality levels and completion times and simply leaves these matters to the employees, an uneven level of performance may be the result.

The wide variety of maintenance and operations duties results in a need for many standards. Establishing standards is not easy. The first step is to arrive at a clear understanding of the levels of accomplishments to be attained. This step is essential to the successful operation of the department. Current job descriptions, accurately assigned work loads, and a method of equally distributing the work load among personnel within each school and among schools are essential elements in establishing work standards.

Staff Development

Because people are an organization's greatest resource, it is vital that administrators help the members of their staff develop their full potential. One important means of assisting staff members in this process is through an effective program of staff development. An effective program of training should include development of technical problem-solving and communication skills and should revolve around topics that the staff identified in a needs assessment survey as high priorities.

Because the California Legislature also recognizes the need for staff development for classified staff members, the *Education Code* authorizes governing boards to grant leaves to classified employees for study or retraining and provides for partial or full compensation to employees who meet certain conditions. Staff development can take many forms, and the certificated administrative staff must have the educational background needed to explore the various means with which to provide a sequential, planned program for improving the classified employees' knowledge and skills.

Essential ingredients. Adult night school is one resource that can be included in a staff development program. Courses for classified employees can be instituted by the school district. These courses must be open and must be of interest to the general public. If these and other prescribed conditions are met, a district that provides the courses may include the attendance of such students in its annual attendance reports to the state.

An important decision to be made concerning departmental training programs is the selection of those who will conduct the training. Depending on the subject to be studied, the presenters can be experienced members of the district staff, personnel from offices of county superintendents of schools, college instructors, community members who have a specialized background, or employees from nearby school districts.

In addition to the district-level workshops or courses that may be offered, at least one annual institute or training program for persons employed in classified positions may be held by the county superintendent of schools. The office of the county superintendent of schools can assist in organizing, planning, and conducting regional training programs. School district participation in program planning will help the county superintendent provide for district needs and will ensure that the instruction is applicable to the problems of each district.

Small-sized to medium-sized districts are sometimes unable to provide a complete training program. As a result, new custodial personnel added to the staff during the school year may receive little or no training before they begin their jobs. One solution to this problem is to assign either the head custodian of one of the largest schools in the area or a night custodian and a member of the night staff to instruct new employees. This preliminary training is designed to help new employees begin their jobs with the necessary minimum knowledge. Later, during the summer, a comprehensive course may be given to all new employees hired during the year.

Supplemental staff development may be provided through apprenticeship programs. One type of apprenticeship program that may be administered successfully in a district of any size is one that assigns inexperienced employees to skilled workers so that the employees can receive on-the-job instruction in specific crafts. As these beginners gain experience, they are given more difficult tasks. After they demonstrate satisfactory performance, they are classified as skilled workers.

Another practice in apprenticeship training, one more adaptable to larger districts, is to provide a training center or shop at one of the district's schools. Here skilled workers instruct small groups of trainees in particular crafts. This instruction is continued until the trainees have sufficient knowledge to assume some job responsibilities under supervision.

Another resource for staff development is coursework offered through many technical schools. During the past several years, technical schools have offered extension courses for maintenance and custodial personnel. The courses are conducted by specialists and consist of lectures, discussions, audiovisual presentations, demonstrations, trainee participation in the performance of certain tasks, and panel presentations.

In small districts in which custodians do all maintenance work except contract maintenance, special training should be given in the kinds of maintenance tasks the custodians will perform. In large districts with separate maintenance and custodial crews, training programs may enable staff members to move from one job category to another; or instruction may be limited to improving skills within work categories. Training in the various maintenance work categories may include specialized activities. In many parts of California, manufacturing concerns, the building and trade professions, and industry may provide presenters for staff development programs. Presenters should be experts in the area they teach and skilled in practical teaching methods.

Some manufacturers of school materials, furniture and equipment, and operations supplies will provide skilled personnel to train maintenance employees in maintenance techniques and methods of using their products. They should not be permitted to try to sell their products. Most companies realize that consumer satisfaction is important and are willing to spend time and money on research to improve their products and create greater consumer demand. The research findings may not be available to the general public, but the data may be used by company representatives as instructional course material. In addition, districts may also use architects and engineers as resource persons. Many large industries employ maintenance specialists. These specialists may conduct instructional sessions for school district employees.

No single model for a staff development program will meet the needs of every district. Districts should take into account many factors when planning for staff development. The model used for any specific staff development program may vary, depending on the district's philosophy, needs, and resources. Generally, the most effective staff development program includes theory, demonstration, practice, feedback, and on-the-job application. In addition, the staff development program should be concrete and should be aimed at specific skills, individualized to meet the need of each staff member, and conducted throughout the year.

Implementation of the program. Once the essential ingredients of an effective staff development program are understood, the next step is implementing the program. The maintenance and operations director must assign staff development a high priority. The manager's feelings will be conveyed to the staff; therefore, it is important that he or she believe that improvement and positive changes will result from the staff development program. A good manager will be sensitive to the needs of staff members and will attempt to match individual needs with available resources. A good manager will also keep informed by reading professional journals and attending conferences.

The final step in creating a staff development program is allocating resources. The money to pay for the costs of a staff development program should be available before the program begins. A district may cut costs by sharing expenses with other districts, or several districts may agree to conduct educational programs for classified personnel as a joint venture. Through a cooperative effort at the local level, the training programs can be adapted to meet the needs of the individual districts.

The policy of employee compensation for district-sponsored workshops should be decided at the local level. Whatever policy is established, the value that the district places on training will be reflected in that decision.

The policy for compensating trainees and instructors should be clearly defined before staff development training begins. The plan that is best for the individual district should be adopted. Workshops can be held during school vacation and during regular working hours, and employees may be excused from regular work to attend the workshops. Workshop attendance may be made a requirement for employees to attain the next additional salary step or to reach and stay on the top step of the salary schedule. Job descriptions, career ladders, and staff development should be designed for retention of qualified personnel.

Staff Relations

Communication between employees and employers is essential to the success of an organization. Many variables are involved in the process of organizational communication and tend to fall into two major categories—upward communication from employee to supervisor and downward communication from supervisor to employee.

Downward communication falls into five distinguishable categories:

1. *Job definition.* Employees should be told what tasks they are expected to perform.
2. *Rationale.* Employees should be given an explanation of the purpose of the job and how it fits into the goals and objectives of the district.
3. *Information.* Employees should be informed of job benefits, rules, regulations, and procedures.
4. *Evaluation.* Employees should be informed of evaluation procedures, including information on the quality of employees' performance.
5. *Ideology.* Employees should be informed of organizational goals and objectives and understand why their support of these goals and objectives is important.

Although these categories appear quite simple, effective downward communication is not a simple function. Management should not assume that formal channels of communication are always effective in providing employees with needed information. Communication is a process that must be continually reviewed and refined.

Factors that have significant influence on the effectiveness of upward communication are the following:

1. Upward communication is likely to be used by management if it is stated positively.
2. Timely communication has impact.
3. Communication that supports current policy is likely to be accepted.
4. Upward communication is likely to be effective if it is directed to the person who can take direct action on it.
5. Upward communication is effective when it appeals intuitively to the receiver's sensibilities.

Neither downward nor upward communication will be effective, however, unless employers and employees develop mutual respect, trust, and openness. In an organization in which employer-employee relationships exist in a climate of openness, trust, and support, job satisfaction and organizational effectiveness will be enhanced.

To be effective, the maintenance and operations department must coordinate the management of facilities with the total instructional program. Staff relationships in the schools, which are occupationally complex organizations, can be improved if each employee is well informed regarding the role and function of all other employees. Advisory committees composed of management, instruction, design, construction, and maintenance and operations personnel will facilitate this type of understanding.

Developing and Presenting a Budget

The governing board is responsible for establishing philosophy and policy to use when developing the budget. The philosophy and policy should ensure that the budget supports an appropriate level of maintenance and operations functions. Although the budget is developed annually and is based on policies approved by the board, budgeting should be a continuous process that allows for flexibility based on changing needs. The budget should be a tool of the administration and should represent the resources necessary to accomplish the goals of the governing board. The three major budget considerations are the total educational program, expenditures, and revenue.

Because the revenue and expenditure estimates used to develop the budget are projections for a year in advance, these projections may not be precise. As a result, estimates must be revised continually. In some districts budget revisions are made monthly. Revisions are especially important because revenue is received at an uneven rate during the year, and some expenditures do not occur regularly. Updating the budget will help to avoid deficit financing and keep expenditures in line with revenues.

Projecting Budget Needs

The first step in preparing budget estimates for the maintenance and operations department is to establish a clear picture of the work to be accomplished. The maintenance and operations section of the total school budget should represent an honest, realistic attempt to set forth patterns of action that will provide the best environment for the district's short-term objectives and long-range goals. Normal repairs of buildings and equipment, replacement of equipment, and upkeep of grounds may be budgeted for on the basis of accounting and personnel data and by projections derived from maintenance control records and the annual technical inspection. Other considerations in projecting budget needs are shifts in the local economy, redevelopment programs, changes in housing patterns, and technological advances. In addition, costs should be anticipated for alterations in the physical facilities because of amendments to legislative directives or by shifts in district instructional policy. Budget cuts are sometimes necessary; however, before cuts are made in the areas of maintenance and operations, careful consideration should be given to the long-term impact on the instructional program.

To carry out the governing board's policy of adequate budget resources for the maintenance and operations function, the administration must determine the proper level of support. Criteria which can be useful have been developed based on factors of (1) cost of maintenance and operations based on square footage; (2) a percentage of the total general fund operating budget; and (3) a percentage of the building and equipment replacement value. A provision for a maintenance reserve fund is also worth considering. Meaningful criteria should be established for deciding the maintenance and operations budget. But it should be noted that data on past expenditures may not be appropriate for projecting future budgets.

Establishing a Reserve Fund

One of the most important responsibilities of a school business manager is to justify objectively how much money should be spent for maintenance of the school plant, including (1) repair of buildings; (2) repair of equipment; (3) replacement of equipment; and (4) upkeep of grounds.

It is practically impossible to put a price tag on the invisible deterioration that occurs every year on every component part of the facilities. Maintenance needs are, therefore, usually determined only by the deterioration of facilities that can be seen and obviously need to be repaired, overhauled, or replaced.

In the absence of any knowledge of unanticipated or emergency maintenance needs, districts typically budget a reserve fund for unforeseen needs and hope it is sufficient. Too often, figures based on average daily attendance (a.d.a.), average daily membership (a.d.m.), number of students per teacher, classroom square footage, and other figures are used for comparison. None of these figures describes the true maintenance needs as well as a percentage of the 100 percent replacement values. This percentage is directly related to the amount of property to be maintained and is automatically adjusted for changes in labor and material costs each year. Experience has shown that total maintenance expenditures each year should not be less than 2.9 percent of the building replacement values. This amount, of course, does not provide for "catch-up" needs.

Establishing an annual maintenance reserve fund for repair of buildings and equipment, upkeep of grounds, and replacement of equipment is the only course to take to guarantee taxpayers and teachers maximum life for facilities and always provide satisfactory teaching stations for the instructional process.[1]

School districts should consider establishing a districtwide annual maintenance reserve fund. This fund would be used for the adequate and reasonable repair of buildings, repair and replacement of equipment, upkeep of grounds, and a preventive maintenance program. Establishing a total annual maintenance reserve fund involves several steps. These steps are outlined in figures 5 through 11.

The process of determining a total annual maintenance reserve fund (completing figures 5 through 10) can help to determine the maintenance funds to be included within the revenue limit and reserves to be raised. Figure 11 includes the formula for determining the maintenance funds needed.

Presenting the Preliminary Budget

After all phases of the maintenance and operations department have been analyzed, the findings should be incorporated in a preliminary budget that reflects all items of concern to management on a districtwide basis. The director of maintenance and operations should supply supporting data, such as charts, graphs, figures showing trends in cost patterns, and staffing and wage estimates, to accompany the preliminary budget. The detailed information gathered through

---

[1] Material in the first four paragraphs of this section is adapted from S. C. Joyner, "How Much Should the District Spend for Maintenance?" *CASBO (California Association of School Business Officials) Journal of School Business Management*, Vol. 42 (September, 1976), 17.

	*Column I**	*Column II***	*Column III*
(1) All elementary school buildings	______ square feet x	$ ______ Weighted average square foot cost for elementary school buildings	= $ ______ . 100 percent replacement value of elementary school buildings
(2) All junior high school buildings	______ square feet x	$ ______ Weighted average square foot cost for junior high school buildings	= $ ______ . 100 percent replacement value of junior high school buildings
(3) All senior high school buildings	______ square feet x	$ ______ Weighted average square foot cost for senior high school buildings	= $ ______ . 100 percent replacement value of senior high school buildings
(4) Community college buildings	______ square feet x	$ ______ Weighted average square foot cost for community college buildings	= $ ______ . 100 percent replacement value of community college buildings
(5) Support buildings not included in above	______ square feet x	$ ______ Weighted average square foot cost for support buildings	= $ ______ . 100 percent replacement value of support buildings
(6) Total	______ square feet x Column I	$ ______ Column II ÷ Total of Column I	= $ ______ . Column III Square feet x $______ = $ Column III

*Figures to complete Column I must be provided by the school district.

**Figures to complete Column II are determined by the State Allocation Board, Department of General Services, and are based on the total cost of all projects approved in the previous year, regardless of size of job or region.

Fig. 5. Formula for determining the 100 percent replacement value of the district's buildings

---

1.8 percent of total 100 percent replacement costs of buildings

(1.8 percent) .018 x Column III, Number (6), in Figure 5 = Annual reserve fund needed for repair of buildings

.018 x $ ______ = $ ______

Fig. 6. Formula for establishing an annual reserve fund for repair of buildings

Equipment values average 11 percent of building cost. Repair of equipment averages 5 percent of replacement value of the equipment.

11 percent of Column III, Number (6), in Figure 5 = Equipment replacement value

11 percent of $ ____________ = $ ______________

5 percent of Equipment Replacement Value = Money to be budgeted for annual repair of equipment

5 percent of $ ____________ = $ ______________

Fig. 7. Formula for establishing annual needs for repair of equipment

---

Repair of building reserve needs / Total square feet of all buildings = ______________ Cost per square foot for repair of buildings $ ______________

5 percent of the square foot cost for repair of buildings = ______________ Cost per square foot for upkeep of grounds $ ______________

Total square foot of grounds multiplied by the cost per square foot for upkeep of grounds = ______________ Annual reserve needed for upkeep of grounds $ ______________

Fig. 8. Formula for establishing annual reserve needed for upkeep of grounds

---

An expenditure of 3.33 percent of equipment value means an average life of 30 years for all combined equipment.

3.33 percent of $ ______________ (Total replacement value of equipment) = ______________ (Annual reserve needed for replacement of equipment)

Fig. 9. Formula for establishing annual reserve needed for replacement of equipment

---

Repair of buildings	$ ______________
Repair of equipment	$ ______________
Upkeep of grounds	$ ______________
Replacement of equipment	$ ______________
Total annual depreciation reserve fund needed	$ ______________

Fig. 10. Formula for determining the total annual depreciation reserve fund needed for all maintenance

---

______________ (Percent of operating budget spent for all maintenance in previous year) percent of $ ______________ (Annual operating budget) = $ ______________ (Amount of maintenance money to be included within each year's operating budget)

$ ______________ (Total annual maintenance reserve needed) minus $ ______________ (Maintenance reserves included within operating budget) = $ ______________ (Additional amount of maintenance reserve to be raised for an adequate program)

Fig. 11. Formula for determining maintenance funds to be included within revenue limits and reserves to be raised

technical and nontechnical annual inspections and surveys will be essential.

Next, the district's budget committee should make comparisons of expected income against proposed expenditures for the total educational program and revise the preliminary budget accordingly. After the revisions have been made and the committee is satisfied that the budget complies with the guidelines supplied by the superintendent or by the governing board, the budget should be presented to the board for approval. In addition to presentation of the preliminary budget to the board, presentations should also be made to other groups, such as taxpayer organizations, employee bargaining units, the parent-teacher associations, and other community groups.

Planning for Budget Expenditures

Most charges against the budget will be for anticipated expenditures built into the budget. Salaries, preventive maintenance on facilities and equipment, and the ongoing operations program are examples of anticipated expenditures that are budgeted and approved by the governing board in advance of the expenditure.

No matter how carefully the budget is prepared, unanticipated expenditures will have to be made. Projects resulting from emergencies and not directly budgeted for must, however, be authorized by the governing board. The director of maintenance and operations should request approval for emergency projects from the board and submit an estimate of costs with the request. If the board approves the request, funds are authorized from the undistributed reserve funds. The job authorization is processed the same as one for any other budgeted job.

Most authorities agree that the managers who are responsible for the maintenance and operations department should have the authority to spend an amount designated by the governing board to take care of emergencies. When this type of expenditure has been made, the board should ratify the costs at the next board meeting. As a rule a reasonable amount of money is set aside in the budget for normally occurring emergency repairs. If major breakdowns occur, however, such as those caused by fire, excessive vandalism, or floods, the board should authorize the use of reserve funds to cover the expense. In addition, when changes in safety or health laws require modification of buildings or equipment or when inspections during the year show a deficiency in the facility that needs immediate attention, additional funds should be requested from the board.

Other unanticipated expenditures may occur during the course of the budget year because of an unexpected program change that is initiated by management or by the governing board. This program change may call for additional custodial personnel and building modification. Additional funds, other than funds for maintenance, should be allocated to meet such needs.

Acquiring Facilities, Equipment, and Supplies

The acquisition of facilities, equipment, and supplies for maintenance and operations represents a significant portion of the total budget. Care should be taken in selecting equipment and supplies, in purchasing according to specifications and by competitive bid, in planning quantity purchases, and in scheduling cost-effective purchases.

Because labor accounts for a major portion of maintenance and operations costs, managers should procure labor-saving equipment for all frequently occurring jobs. Adequate tools in the hands of competent maintenance personnel will quickly repay the purchase price in time saved. Examples of such tools are portable pipe-cutting machines; paint-spraying machines; electric drills, saws, and sanders; and landscaping equipment. A single piece of equipment should not be expected to perform many functions. Overuse of equipment can result in significant downtime for repairs or transportation. Purchasing fewer pieces than needed or items of poor quality is not cost effective in the long run.

If maintenance material has been on the market for several years, its quality is generally known. New materials that are claimed to be superior and less expensive than older products are being developed rapidly. However, new products should not be substituted for those of known high quality unless tests prove their superiority. Among products and materials that should be tested are floor coverings; mastics; waxes, seals, and finishes; paints; varnishes; weatherproofing substances; roofing systems; and cleaning compounds. Product testing can be useful, but to make a test meaningful, a product's function should be considered. Once its function is clearly understood, its usefulness can be measured.

Performance standards can be effective in evaluating materials and supplies. Carefully designed standards can be used in developing specifications prior to the letting of bids and the purchasing of the materials. The equipment and supplies received from vendors should be tested periodically to determine that the district actually obtains what was ordered. The goal of purchasing equipment and supplies should be to obtain the highest quality product at the lowest possible price. When products have been tested and used successfully, they should be included on the standard school supply and standard school equipment lists. These lists should be updated annually.

Specifications and Competitive Bidding

Specifications may be established by listing brand names or trade names or indicating "or equal"; describing materials as to purpose and use; indicating federal or state standards; referring to certified product lists; or referring to qualified product lists. The completed document should list specifications by telling the seller exactly what the district wants and expects to be delivered. The document should be broad enough to permit as much competition as possible and should emphasize performance standards or chemical composition. This document may contain instructions for inspection, marking, packaging, and delivery as well as provisions for settling disputes.

Quantity Purchases

Additional savings can be realized by purchasing large quantities of supplies and equipment. If adequate storage and distribution facilities are available, this practice is generally advisable. Quantity purchases can be made by the office of the county superintendent of schools. Some counties have developed a system that ensures that all material is delivered at one time during the summer. This procedure has resulted in substantial savings to school districts. Some advantages of quantity purchasing are as follows:

1. Vendors usually quote prices lower than those generally available. The quotations are based on known current prices rather than on future prices.
2. Price quotations are usually lower because of single manufacturing runs, a single delivery period, and a single invoice.
3. Material is normally handled only once in the warehouse or in the schools.
4. With materials on hand, work will not be delayed, and time will be saved.
5. Many emergencies can be handled without preventing interruption of services.
6. A single receiving notice is required for payment. This results in fewer bookkeeping and clerical operations.

Some disadvantages of quantity purchasing are that (1) more storage space is required in the warehouse or in the schools; and (2) sources of supplies may be limited to the larger companies because of the volume involved.

Scheduling of Purchases

Dollar savings can be made if large quantity purchases are made during off-peak periods. Purchasing during heavy peak periods, such as just before the summer vacation, is not desirable because the demand for the available supply is thereby increased. Advance planning and adequate storage can make it possible to obtain the lowest prices.

Monitoring the Planning, Constructing, and Equipping of Facilities

Many maintenance problems confronting managers are directly related to building design, construction, and choice of materials and equipment. Clearly, if certain steps are taken during the planning, construction, and equipping stages of new facilities, most of these problems should not arise. The important steps in building low-maintenance factors into new plans include the following:

- Utilizing experience in planning and keeping alert to new technology
- Standardizing components
- Specifying low-maintenance materials
- Requiring adequate supervision and inspection
- Choosing nearby suppliers of mechanical equipment
- Purchasing furniture and equipment by specification
- Arranging on-site training for maintenance personnel
- Filing as-built plans and specifications
- Providing a building manual

Utilizing Experience

School facility specialists and consultants can provide valuable assistance in planning school facilities, and governing boards and managers may recognize the value of the advice of these persons. However, they frequently overlook the advice of custodians, maintenance personnel, and supervisors, who may know from experience the types of custodial equipment and apparatus needed, the design and location of space for storage, and the manner of placing various types of equipment to provide optimum facility maintenance and operation. They may also be able to make appropriate suggestions regarding the number and location of electrical outlets, service sinks, and water faucets. Custodians who will operate the mechanical systems of new buildings should be encouraged to visit these buildings during various stages of construction so that they may become acquainted with design, construction, and operating details.

In addition, maintenance personnel can draw on experience to recommend ways to design and construct facilities economically, and long-term savings can be realized by incorporating these recommendations in the design and construction of school facilities.

Important economic considerations in designing and constructing school facilities include the following:

1. Select hardware and finishes that require low maintenance.

2. Select doors of the right kind and weight to hold the type of closers specified.
3. Install piping so that sections of walls, ceilings, or floors do not have to be removed to repair pipe lines.
4. Install pipe chases that are large enough to permit easy maintenance operations.
5. Specify adequate flashings and provide for fire safety.
6. Install water, sewer, gas, and steam lines that are large enough to accommodate future additions.
7. Select durable floor coverings or floor finishes.

Standardizing Components

Some designers object to standardizing the overall building design, but they are not necessarily opposed to standardizing component parts, such as windows, doors, chalkboards, hardware, plumbing fixtures, electrical outlets, switches, heating equipment and controls, and classroom equipment. For example, if windows are standardized throughout the system, glass replacement can be handled much more efficiently and economically. Doors for classrooms, hallways, closets, storage rooms, gymnasiums, and auditoriums can be standardized according to size, design, and type.

Such standardization is practical. With fewer types and sizes of material and equipment, a smaller but more complete stock of repair and replacement parts may be kept in inventory, allowing repairs to be made promptly. Also, workers who have fewer types of jobs to perform are generally more proficient at those jobs.

As the district is able to add to its standard component list, this list should be compiled into a specification handbook. Copies of the handbook should be made available to architects.

Specifying Low-Maintenance Materials

The district's governing board members, administrators, maintenance personnel, and architects should consider designing a facility so that the initial cost of construction includes the costs of materials designed to reduce long-term maintenance costs. Practical experience has shown that the initial cost of a structure could well represent only a small down payment when compared with the total cost of maintenance over the life of the building. Architects are often asked to justify the use of more costly materials in terms of precise savings in maintenance over the years. Actually, reducing this ratio to dollars is difficult because comparative long-term figures are not usually available. However, whenever materials are specified, long-run maintenance and operations costs should be considered. For example, according to some estimates the cost of installing resilient tile on concrete floors can be recovered in three and one-half years because of lower maintenance costs.

Requiring Supervision and Inspection

Supervision and inspection during construction of a school building is the responsibility of the governing board. This responsibility is usually delegated to the architect and to the building inspector. The architect is employed to supervise the job in progress as well as to make a thorough engineering inspection upon completion. Additional inspections are conducted by the building inspector who protects the district and the architect by making sure that the contractor is performing to specifications.

The technical guidance of a well-trained, competent architect and building inspector can be extremely valuable to a district during construction of a long-term, low-cost building. Therefore, the architect and the building inspector should be chosen with the same care used in choosing any other professional employed by the district.

Choosing Suppliers of Mechanical Equipment

Future maintenance costs of new buildings depends on the availability of technical services for mechanical equipment. Recent trends in construction indicate that engineers and architects now specify a greater variety of complicated equipment and controls. When such equipment fails to function, the services of factory-trained mechanics are often required. If these services can be obtained more reasonably from nearby suppliers, local dealers who can furnish mechanical equipment should be chosen.

Purchasing Furniture and Equipment by Specification

The term *furniture and equipment* refers to such items as seats, desks, laboratory tables, lockers, auditorium seating, and instructional machines. It does not include heating, plumbing, or electrical items that are considered a part of the building.

Usually, furniture and equipment are not included in the general contract. Not including furniture and equipment in the general contract eliminates architect's fees and contractors' profits on these items. However, careful specifications should be drawn and competitive bid procedures followed when a district purchases furniture and equipment. Selection should be made as soon as possible so that provisions for spacing, utility connections, waste lines, and other requirements can be made during construction.

Using carefully prepared specifications for such equipment can help to eliminate items that require excessive maintenance. For example, experience has shown that cast-iron standards for fixed auditorium seats are more durable than steel standards. If cast

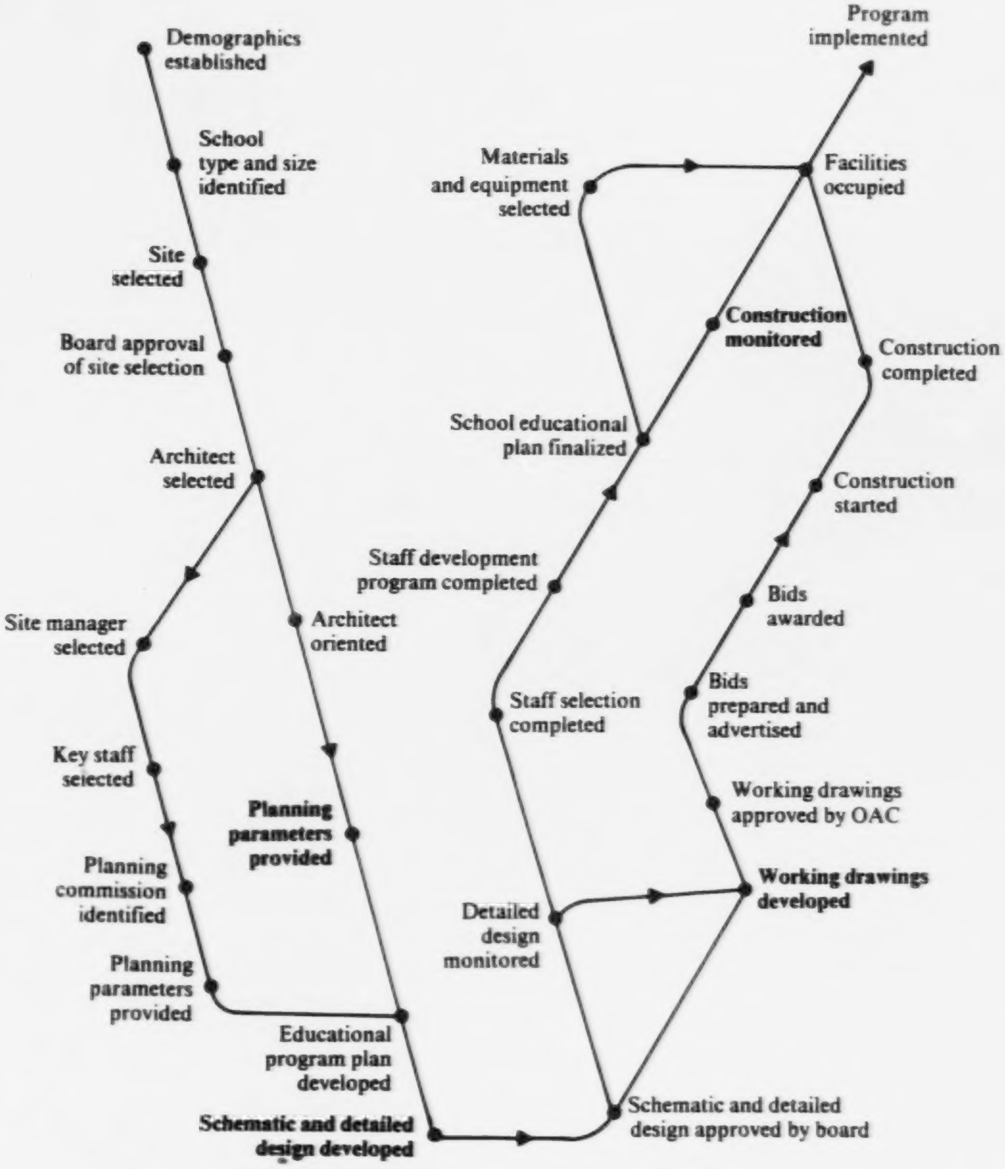

Demographics established
School type and size identified
Site selected
Board approval of site selection
Architect selected
Site manager selected
Architect oriented
Key staff selected
Planning parameters provided
Planning commission identified
Planning parameters provided
Educational program plan developed
Schematic and detailed design developed
Schematic and detailed design approved by board
Detailed design monitored
Staff selection completed
Staff development program completed
School educational plan finalized
Construction monitored
Materials and equipment selected
Facilities occupied
Program implemented
Construction completed
Construction started
Bids awarded
Bids prepared and advertised
Working drawings approved by OAC
Working drawings developed

Fig. 12. Major events in construction and educational program planning

iron is not specified, suppliers may deliver steel standards.

Early selection of equipment may play a part in maintenance costs. Building modifications made necessary because equipment specifications were unknown are often charged to maintenance rather than to construction.

Arranging On-Site Training

District maintenance personnel should be thoroughly familiar with the details of every system they are required to maintain. Also, maintenance personnel should know the maintenance requirements for other pertinent features of the building. Operating manuals that deal with the daily care and general maintenance of equipment are generally supplied by manufacturers, but no manual can be expected to meet all needs. When a new building is constructed, employees who are responsible for building maintenance and operation should be given on-site briefings on the mechanical system and other aspects of the structure. Manufacturers whose products are used in a building may furnish factory-trained instructors for this purpose. Using this service may minimize service calls, prevent costly breakdowns, and reduce overall maintenance costs.

Filing Plans and Specifications

A complete set of plans and specifications for each building on the site should be filed in the principal's office. The architect usually provides sufficient copies of the "as built" plans to meet district needs. Provision for these plans should be included in the contract with the architect.

Obtaining a Building Manual

The board's contract with the architect should specify that one or more copies of a building manual be supplied upon completion of the building. The manual should contain the following items:

1. An aerial view of the site
2. A plot plan drawn to scale, showing the general outline of site facilities, including buildings, paved areas, walks, landscaped areas, incoming utility lines, main shutoffs for water, gas and electricity; correct measurements of the site; location of fireplugs; and the names of adjoining streets
3. A floor plan of each building, drawn to scale, including the name and number of each classroom
4. Codes to indicate the type of floor covering and the exact measurements of each room and roof types by building sections
5. Manufacturer's instructions on the installation, operation, and maintenance of building components and equipment and factory lists for replacement parts for all machinery and equipment

Each school district should compile or adopt an existing program to standardize building and equipment details. These standards can lead to lower long-term maintenance costs and should be used in conjunction with the district's educational specifications and the most current design practices. These standards should be updated consistently to include the latest changes in technology, keeping in mind the basic relationship between standardization and long-term maintenance costs.

Figure 12 depicts the major events in construction and educational program planning. Four major events involve the director of maintenance and operations. These events include providing planning parameters, developing the schematic detailed design, designing and developing the working drawings, and monitoring construction. Since the design and construction of a building has great impact on maintenance, the director of maintenance and operations should participate fully in the total planning process.

Evaluating the Effectiveness of the Maintenance and Operations Program

An essential element in the management of an effective maintenance and operations system is the evaluation of performance. Program evaluation helps the board to ensure that certain standards, goals, and objectives are being accomplished and also assists managers in implementing improvements, including recommendations made by the governing board. For maximum effectiveness, evaluation should be done regularly and should be based on certain standards:

1. *Condition of facilities.* Has the maintenance manager achieved the objective of a well-maintained facility?
2. *Maintenance and overhaul plans.* Has the maintenance manager successfully administered maintenance and overhaul plans as scheduled, regardless of breakdowns?
3. *Employee morale.* How do maintenance personnel and custodians feel about their jobs and themselves? (See Appendix C for guidelines to evaluate custodial programs.)
4. *Attitude of district administrators.* Are district administrators aware of the role and needs of the district's maintenance department?
5. *Districtwide support.* Do staff members throughout the district as well as top managers support maintenance and operations activities?

Chapter 3

Managing a School District Maintenance Program

California school districts are faced with a backlog of deferred maintenance repairs for elementary and secondary schools. Because of inflation, declining enrollments, reduced revenues, and demands for increased spending in other areas, school facilities have been allowed to deteriorate rapidly. These school facilities represent a multibillion dollar taxpayer investment entrusted to the management of governing boards and school managers. Many school districts have not established even an adequate maintenance program, nor have they committed consistently the funds necessary to provide for repairs as breakdowns occur.

In many California school districts, maintenance programs have been given low priority in the annual budgeting process. The cuts in budgets for maintenance have resulted in deterioration that, although often rapid, is not obvious until it begins to jeopardize the entire instructional process.

Terms Related to Maintenance

Many terms are used to describe maintenance needs. Many of these terms have their origins in colloquial derivations, and some reflect the type of condition under which the maintenance need occurs. Titles such as *periodic maintenance, recurring maintenance, replacement maintenance, emergency maintenance, preventive maintenance, ongoing maintenance*, and *deferred maintenance* are commonly used.

Management accounting procedures require that technical definitions be blended with accounting and budgeting considerations. This often means that accounting terminology is paramount in deciding the definitions to be used. For example, improvements, additions, and modifications to buildings are considered capital outlay expenses, not normal ongoing maintenance expenses. Consequently, these expenses are not charged to maintenance personnel and maintenance supplies accounting classifications. Improvements and additions are capital outlays outside the realm of a maintenance definition.

In the context previously mentioned, two definitions of maintenance are quite prominent in school facility maintenance operations. These are *annual ongoing maintenance* and *deferred maintenance*. *Annual ongoing maintenance* refers to maintenance requirements that should be performed each year to keep facilities in the proper state of maintenance and should be provided for in the annual school district budget. *Deferred maintenance* refers to annual ongoing maintenance requirements that for some reason, such as the lack of resources, cannot be accomplished each year and must be deferred.

Maintenance consists of periodic care, repair, or replacement necessary to maintain a school facility in top operating condition. This periodic care, repair, or replacement can be identified according to content and frequency for every component in a school facility.

The amount of maintenance that should be accomplished each fiscal year to maintain a school facility properly can be identified, projected, and costed. This ongoing maintenance should occur each fiscal year and may consist of:

1. *Breakdown maintenance.* This includes emergency maintenance to equipment and is necessary to continue normal school functions.
2. *Operating maintenance.* This includes maintenance necessary for a component to function and operate properly. Operating maintenance usually consists of such tasks as lubrication, belt replacement, tune-up, and replacement of lighting ballasts.
3. *Preventive maintenance.* This includes regularly scheduled maintenance based on a life-cycle projection of various components. Preventive maintenance ensures optimum functioning and prevents breakdowns. Many school maintenance departments are not provided adequate budget resources to accomplish the preventive maintenance program. These departments perform basic maintenance that is requested by school site personnel, using a service work order request. School maintenance departments that respond to only work order or demand maintenance may be accomplishing only 40 to 50 percent of the total maintenance needs.
4. *Overhaul maintenance.* This includes periodic major repair or replacement of operating parts and components of equipment. Overhaul maintenance requires the piece of equipment to be out of service or down (downtime) during the overhaul process and usually requires highly technical knowledge and skill to accomplish.

Status of School Maintenance

Poor maintenance jeopardizes the multibillion dollar school investment. That was the finding of the Little Hoover Commission that also reported that a disturbingly large proportion of the state's school facilities were in serious need of major maintenance work.[1]

Although some districts have done an exemplary job of maintaining their physical plant, the California Association of School Business Officials (CASBO) estimates that less than 5 percent of the state's school districts have adequately maintained their facilities. This situation jeopardizes an investment of billions of dollars in state, federal, and local tax money.

In its report the Little Hoover Commission also noted that a large number of public elementary and secondary school facilities were in poor physical condition and recommended that the State Department of Finance examine the problem more thoroughly. Acting on the commission's recommendation, the State Department of Finance published a study that documented the extent and immediacy of the maintenance backlog. This study indicated that maintenance costs of school facilities do not vary with the intensity of use. Rather, these costs arise primarily from the mere existence of facilities. Thus, if facilities are to remain on the school district's inventory of property, the district must adequately budget for proper maintenance. In addition, the study included a review of specific actions that the state and local educational agencies could take to eliminate the backlog and prevent its recurrence.

Because of the severity of the maintenance backlog and the potential danger it poses, the Department of Finance's study recommended that the California Legislature act immediately to implement specific actions to counteract the problem. This action included instituting a properly funded annual maintenance program with appropriate management controls and a funding mechanism to eliminate the current backlog. In addition, as a prerequisite to receiving certain state funds, the study recommended that school districts seek the State Allocation Board's approval of a facilities plan that would require a comprehensive review of maintenance needs, utilization practices, and capital outlay requirements.[2]

According to CASBO any effort to eliminate the existing backlog and prevent its recurrence will require cohesive, integrated action by both state and local educational agencies. In addition to providing financial assistance to school districts to restore school facilities, the state must play a stronger role in ensuring economic and efficient facility operations. At the same time school districts must modify current budgeting processes so that maintenance activities are conducted in a planned, preventive manner rather than in response to breakdowns, and the districts must plan for a systematic review of maintenance and utilization policies, particularly when evaluating the need for additional space.

Planned Maintenance Program

The need for school maintenance begins on the day the school district governing board accepts a building from the contractor, and the need continues throughout the life of the building. Governing boards and administrators may assume that a new building requires little or no maintenance until it has been in use for several years. Yet, it may be costly to wait for several years before developing a planned maintenance program in which repairs and other necessary services are systematically scheduled and completed.

Depreciation of school buildings occurs as a result of normal usage, obsolescence, and vandalism. The goals of a good maintenance program are to keep the facilities reasonably close to their original condition, adequately equipped to provide the services for which they were planned, and modified to accommodate new technologies. Therefore, planned maintenance means keeping the facility in continuous operation and in top condition through repair, replacement, restoration, renovation, or other necessary measures. Scheduled maintenance ideally provides optimum upkeep while using available staff to the best advantage.

The well-kept school serves not only as housing for the pupils but also as a tool for education and as a center of community life. Schools should be maintained and operated to provide top service for all uses. Good school maintenance programs must be well-planned, staffed by competent personnel, operated to serve the best interests of the pupils, and managed efficiently. When a program is carried on in this manner, school managers can more easily justify maintenance costs to the governing board.

When a decision is made to improve the quality of the maintenance program in a district, current policies and management practices should be assessed. The accompanying maintenance checklist can be very helpful in determining areas of need.

Standards, Goals, and Objectives

The maintenance department's efficiency will depend on the standards it sets within the framework of district policies. The maintenance department manager should set forth long-range goals for the maintenance program and then—using short-term objectives—define the steps necessary to reach them. Clear objectives are essential to maintain efficient departmental functions. A report on the appraisal of maintenance performance stated the following:

---

[1] *A Study of the Utilization of Public School Facilities (Grades K Through 12).* Prepared by the Commission on California State Government Organization and Economy. Sacramento: Commission on California State Government Organization and Economy, 1978, p. 2

[2] *A Study on School Facilities Utilization (Report No. 080-5).* Prepared by the Department of Finance. Sacramento: California State Department of Finance, 1980, pp. 45—48.

> There is no easy, simple way to appraise maintenance performance. Such appraisal cannot be reduced to the evaluation of one or two charts or reports. To get an adequate appraisal of maintenance performance, four steps must be taken:
>
> 1. Establish general objectives toward which it is desired, as a matter of company policy, that maintenance progress.
> 2. Establish factors related to each general objective.
> 3. Set specific goals for each factor.
> 4. Derive indices of effectivenes for each factor.
>
> Following these four steps will make it possible for management to:
>
> 1. Evaluate progress being made in the attainment of general maintenance objectives.
> 2. Evaluate progress toward specific goals.
> 3. Act in specific areas identified by each factor to promote attainment of its goal and as a corollary progress toward the general objective to which it is related.
>
> Maintenance standards should always be evaluated according to how well they correspond with program goals and objectives. Systematic accounting is necessary to provide planned maintenance.[3]

Need for a Systematic Program

In the past, school districts tended to build inexpensive energy-intensive facilities. The installation of sophisticated automatic control systems was the only attempt to conserve energy. Consequently, operations once performed manually may now be under the control of intricate automatic devices. As a result, preserving the effective operation of the new systems and avoiding unnecessary depreciation are very important. Otherwise, repair can become a task beyond the capabilities of a normal maintenance force.

In addition, recent technological advances in equipment have imposed new demands on the abilities of maintenance personnel. Staff development should be implemented to keep staff members informed about the proper care and operation of new components and at the same time enable them to carry on their regular duties. Although expert supervision, expert work crews, and an adequate inventory of maintenance items are desirable, they alone do not provide the answer. The solution requires efforts beyond this level.

To accomplish an efficient program, the director of maintenance and operations should consider developing a management information system. This system should provide current information concerning how

MAINTENANCE CHECKLIST

1. Does the district have a maintenance management system?
    a. Does the district have policies on levels of service?
    b. Is the budget based on policies?
    c. Do the policies include planned replacement of equipment?
    d. Are these policies reviewed or revised periodically?
    e. Is there an inventory of facilities and types of maintenance work?
    f. Is there a method of management reporting?
2. Is there a planned or preventive maintenance program?
3. Is there a system of work orders?
    a. Are work orders used for cost analysis and reports?
    b. Are work orders completed accurately?
    c. Are work orders completed in a reasonable period of time?
4. Does the district differentiate between maintenance and capital outlay expenditures?
5. Does the district supply adequate tools and equipment for maintenance staff?
    a. Does the district use surplus equipment and supplies?
    b. Does the district obtain surplus materials only to the approximate extent of need?
6. Does the maintenance staff possess specialized skills only to the extent they are needed for normal operations?
    a. Does the district contract for appropriate jobs?
    b. Is there any attempt to share maintenance jobs with other districts?
    c. Is there a program of in-service training?
7. Is maintenance scheduled on both a short-range and an annual basis to avoid excessive peaks in the work load?
8. Does the maintenance administrator have a local open purchase order with limitations that prevent excessive purchasing?
    a. Are large orders purchased by bids or other methods to obtain the best price?
    b. Is there a method of controlling and accounting for materials?
9. If construction is in progress, does the maintenance administrator have responsibility for monitoring programs and maintaining liaison with the architect and contractor?
10. Does the maintenance administrator have appropriate involvement in the district's facilities master plan?

---

[3] Adapted from Borden Coulter, "Basic Steps in Appraising Maintenance Performance." A report given at a CASBO meeting, n.d. Used with permission.

well the maintenance and operations department meets the requirements of the district's educational program. The director should have knowledge of productive maintenance hours versus nonproductive hours; the cost of maintenance and operations as it relates to tasks, crafts, and projects; the backlog of work by craft areas; the volume of work by priority schedules; and the quality of work performed by individual personnel. The maintenance and operations director should, in conjunction with the business administrator, establish some appropriate system of reporting that reflects the level of efficiency of the organization.

Maintenance Objectives

A well-designed and well-directed maintenance management system is organized according to the maintenance objectives that need to be accomplished and the benefits that result from completing them. The director of maintenance and operations should:

1. Maintain a complete inventory of equipment for ready reference.
2. Establish a reference system of plans, flowcharts, diagrams, manufacturers' instructional manuals, parts lists, and so on to be on hand at all times.
3. Provide a usable, permanent record of preventive maintenance service and emergency repairs (including costs of such repairs). This record can be used to appraise material and equipment and determine if equipment is uneconomical to operate and should be replaced. This record also gives a history of each piece of equipment and eliminates dependence on memory.
4. Provide positive control of the maintenance and operations personnel and their activities.
5. Fix responsibility for maintenance activities and provide a check on performance of maintenance duties.
6. Provide for maximum use and effectiveness of maintenance forces to avoid idle time and wasted effort.
7. Establish a procedure for positive routine maintenance consisting of scheduled periodic service and inspection. This procedure can eliminate superfluous inspections.
8. Give an accurate determination of the total hours and crafts necessary to do the maintenance job and use this determination as a basis for a maintenance personnel staffing pattern.
9. Provide on-the-job training and ready references for new personnel. To do so enables workers to assume quickly their specific duties and procedures.
10. Charge the operations and maintenance staff with the responsibility for setting up the operations and maintenance program within the prescribed framework. This assignment will help staff members become familiar with their own plant and its requirements.
11. Minimize the diversion of personnel to projects not related to maintenance and operations and provide personnel with a definite routine and procedure.
12. Ensure that the maintenance work load is distributed evenly.

If these objectives can be achieved, deterioration will be reduced because property will be kept in good physical condition; top operating efficiency will be maintained; repair costs will be reduced by preventing failures; and operation of the equipment and use of the facility will continue uninterrupted. Finally, accomplishing these objectives will result in adequate support to the educational program.

Key Factors of Program

When developing a maintenance management program, the school district governing board should consider 12 important factors. These factors may be considered part of a continuous cycle involving the following steps (see Figure 13):

1. *Identify the facilities and equipment to be maintained.* To do so requires an inventory of the number, type, and location of all major facilities and installations. The inventory should include types of construction, square feet and types of play areas, types of heating plants, plumbing installations, electrical installations, and so forth. The inventory of installed equipment should indicate the type, make and model, and source of parts for replacement. As appropriate, major equipment should be tagged with an identifying number which relates to the overall maintenance schedule. In addition, the tag should identify the calendar schedule for the maintenance as well as the specified lubricants, fluids, and so forth. A master file should be maintained for each piece of equipment.
2. *Determine the present condition of facilities and equipment.* The condition may be expressed in terms of effective/economic age, types of construction, and present working condition. For planning and budgeting purposes, the condition should be determined through annual inspections conducted by the director of maintenance and operations and the site administrator. These team inspections should be supplemented by periodic inspections through the year by the maintenance and operations staff.

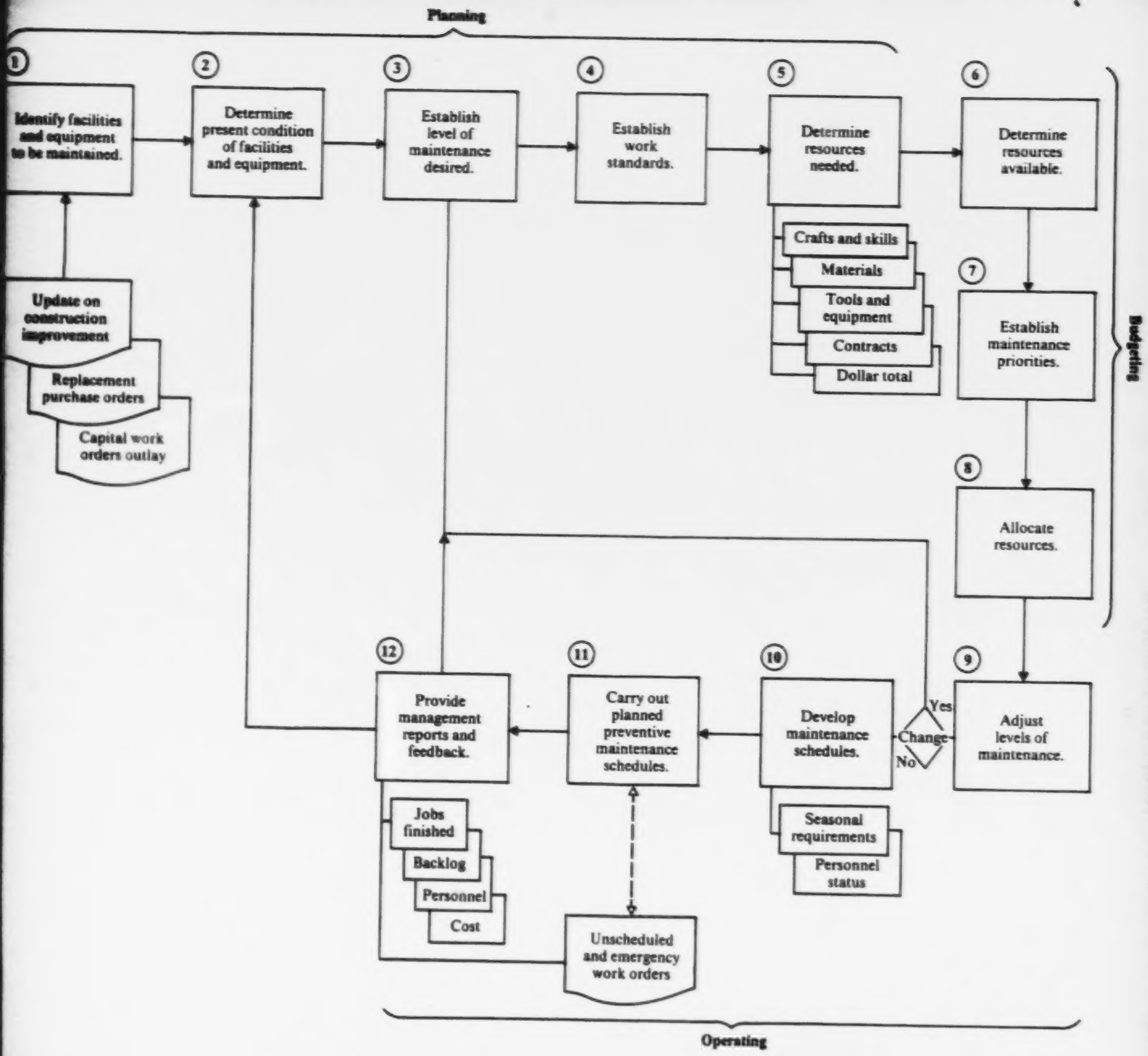

Planning
1
Identify facilities and equipment to be maintained.
2
Determine present condition of facilities and equipment.
3
Establish level of maintenance desired.
4
Establish work standards.
5
Determine resources needed.
6
Determine resources available.
Crafts and skills
Materials
Tools and equipment
Contracts
Dollar total
Update on construction improvement
Replacement purchase orders
Capital work orders outlay
7
Establish maintenance priorities.
8
Allocate resources.
Budgeting
9
Adjust levels of maintenance.
Yes
Change
No
10
Develop maintenance schedules.
11
Carry out planned preventive maintenance schedules.
12
Provide management reports and feedback.
Jobs finished
Backlog
Personnel
Cost
Seasonal requirements
Personnel status
Unscheduled and emergency work orders
Operating

Fig. 13. Flowchart illustrating steps in developing a maintenance management program

3. *Establish the level of maintenance desired.* A preventive maintenance program includes inspection, adjustment, lubrication, parts replacement, and other required operations at specified intervals. In a planned maintenance program, the established level of maintenance will indicate the frequency of repair or the desired level of appearance. For instance, resealing asphalt surfaces every five years or painting schools every seven years would constitute a level of planned maintenance.
4. *Establish work standards.* The standards should refer to time, personnel, equipment, materials, and specifications required for various types of projects.
5. *Determine the resources needed.* Included should be the total number of men or women and the total amount of money and materials required to accomplish the work that was previously identified.
6. *Determine the resources available.* This budgeting function recognizes the fact that there may never be sufficient resources to accomplish all needed or desired work.
7. *Establish maintenance priorities.* The levels and standards of maintenance may present an optimum condition. It is necessary to establish priorities so that the most essential work may be accomplished.
8. *Allocate resources.*
9. *Adjust levels of maintenance.* If resources are reduced, a lower level of maintenance may be required. For example, the painting of buildings might be deferred for an additional year, if necessary, to stay within available budget allocation. The implications of such deferment must be reviewed and financial impact analyzed. Alternative plans must be documented.
10. *Develop maintenance schedules.* The schedules will permit efficient use of personnel and help avoid the cyclic nature of an unplanned program. Some types of maintenance may be better accomplished at different times during the school year. An annual schedule will provide for this flexibility and allow full use of the maintenance force.
11. *Carry out planned preventive maintenance schedules.*
12. *Provide management reports and feedback for the next budget cycle.*[4]

Systematic Maintenance Management Program[5]

Success as a maintenance manager of school facilities rests in the ability to apply current techniques to both technical and management problems. School districts require an effective operations and maintenance department capable of providing the required services to the school facilities at the lowest possible cost. A management program dedicated to improving the effectiveness of facilities maintenance will answer this need. The major elements of this program and their interrelationship are presented here. Additionally, specific suggested parameters and guidelines that can be used to measure the effectiveness of the program are also discussed.

"Seat-of-the-pants" maintenance management may have worked in the past, but it will not resolve today's problems. Maintenance management has become part art and part science; and, like any other discipline, it must be systematized.

The professionalism of maintenance management has rapidly advanced to a point at which matters of organization, staffing, planning, controlling, and reporting cannot be left to work themselves out. A maintenance organization does not operate as a totally independent department within a larger organization. A maintenance organization is the operating heart of any facility and has functional responsibilities to the departments it supports and the personnel who are the lifeblood of the facility. The maintenance and operations department must protect management's investment in fixed assets; and the more proficiently this is done, the more successful the group will be at reducing unnecessary capital expenditures. Left uncontrolled, spiraling maintenance labor and material costs will spell disaster to a facility that cultivates a philosophy of either blank check or breakdown maintenance.

Good working relations among top management, the maintenance department, and the departments that it serves are not a product of chance; they result from the effective application of maintenance management principles. The daily implementation of these principles has far-reaching effects on the:

1. Maintenance manager's ability to achieve the objective of a well-maintained facility
2. Maintenance manager's ability to administer maintenance and overhaul plans successfully as scheduled, irrespective of breakdowns

---

[4] Adapted from *School District Management Review (30-73650): Irvine School District.* Prepared by the School District Management Assistance Team. Sacramento: California State Department of Education, 1978, p. 36.

[5] The material contained in this section was adapted from John P. Shelley, "Effective Operating and Maintenance Services in School District Facilities." Address given before a CASBO meeting, December 14, 1976. Used with permission of Syska & Hennessy, Inc.

3. Morale of all personnel associated with the building or facility
4. Maintenance awareness by top management as to the real role and needs of the maintenance department
5. Total support given to the operations and maintenance organizations

Each facility presents different problems because of diverse layouts and organization, policies and personalities, and age and condition of equipment. There is no one simple way to develop an effective program. However, if basic management principles are applied properly, reduced costs and improved maintenance conditions will be achieved. The application of the necessary management concepts is not easy. The maintenance manager must be aggressive in approaching this task and must persuade workers and management alike.

A proven approach to meeting the goals of the maintenance manager is the development of a systematic maintenance management program. The application of such a program in a facility should be based on the idea that improved efficiency and effectiveness of an operations and maintenance department will help promote the realization of the facility's objectives. Accordingly, the maintenance manager must seek to maximize the productivity of his or her people and systems and at the same time reduce the total cost of operating the department.

Program Functions

A systematic maintenance management program has three major functions:

1. The first function is the provision of maintenance and engineering services to the entire facility. These services include the daily supply of utilities to all departments and the accomplishment of routine maintenance and repair services within the facility.
2. A second function of the program is the design of maintenance and operations management systems that improve the services provided to the operating departments and personnel. These systems must be designed so that they easily integrate with the facility's other management systems, increase maintenance services, and reduce total facility operating costs.
3. The third major function of the program is to develop work measurement and cost improvement procedures.

Achieving a successful maintenance management program requires the dedication and interest of the maintenance manager and the entire staff. Such a program will increase the personal contact of the maintenance staff with the members of other departments, serve to reduce resistance to change, improve communications, and upgrade the capabilities of many members of the organization.

Program Organization

In the course of establishing a truly effective program, the maintenance manager should:

1. Analyze, design, and improve work order systems, work control centers, and work methods.
2. Establish work standards to determine staffing requirements, personnel utilization, and costs.
3. Develop job descriptions, job evaluation plans, and employee motivation plans.
4. Install systems for control of material and supplies for his or her department.
5. Analyze potential economic results of different combinations of personnel, materials, and equipment and develop standards to optimize these combinations.
6. Simplify paperwork and procedures.
7. Improve organization structure, authority-responsibility relationships, and patterns for communications.
8. Develop management reports to establish information systems for managerial control on a continuing basis.
9. Forecast future needs and supply management with information for use in policymaking, fiscal budgeting, building plans, and public relations.

Elements of a Successful Program

Today's complex building and equipment technology requires a constant review of management principles to see how they can be applied to improve present practices. Success as a maintenance manager rests in the ability to apply modern techniques to both technical and management problems.

The development of an effective program involves numerous considerations. Some of the major and more important elements to achieving a sound program are discussed here and illustrated in Figure 14. Although some of the elements in the diagram have a greater effect than others on the total program, no single element is a cure-all for improvement. Each element can bear only limited results: improved conditions, increased productivity, or reduced costs. For this reason all elements must be connected to a central driving force—the maintenance manager and his or her objectives.

Each of the key elements for improving the effectiveness of plant operations and maintenance is presented here in order of priority:

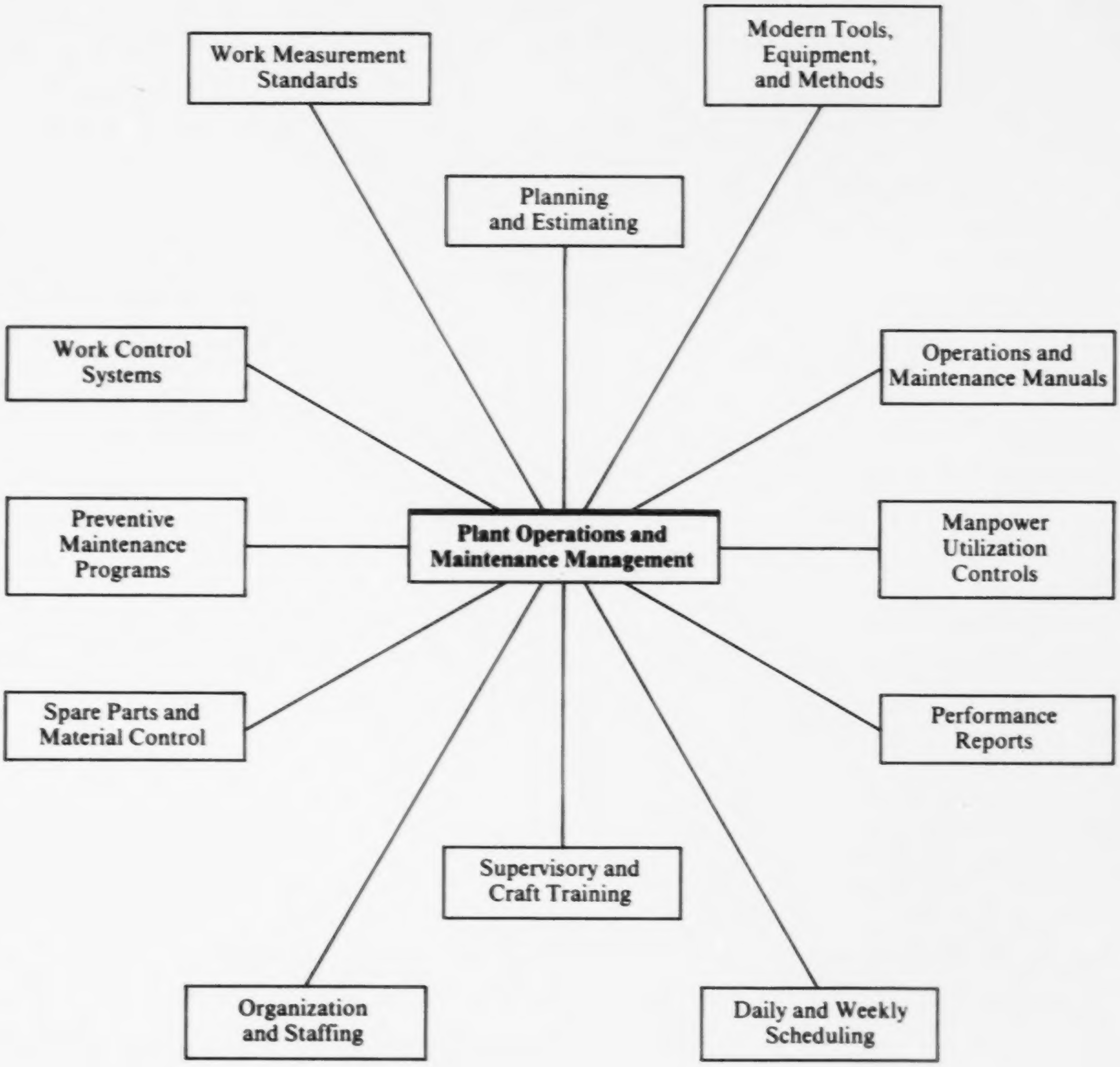

Work Measurement Standards
Modern Tools, Equipment, and Methods
Planning and Estimating
Work Control Systems
Operations and Maintenance Manuals
Preventive Maintenance Programs
Plant Operations and Maintenance Management
Manpower Utilization Controls
Spare Parts and Material Control
Performance Reports
Supervisory and Craft Training
Organization and Staffing
Daily and Weekly Scheduling

Fig. 14. Key elements of an engineering management program

1. *Organization and Staffing*
   a. Clearly define levels of authority and responsibility in the operations and maintenance department. Do not overload supervisory personnel with too many people to supervise. Remember that the basic responsibility of first-line supervision is to direct people and improve productivity. A worker to supervisor ratio of 12:1 is a realistic figure.
   b. Do not give responsibility for planning, scheduling, and reporting to operations personnel. Create a control section and place responsibility in the hands of staff personnel trained in these functions.
2. *Work Control Systems*
   a. Develop a work order and receipt system that permits limited authorization of customer-generated work.
   b. Plan and schedule all routine, special request, and preventive maintenance work.
   c. Respond to emergency/service work by means of a separate multicraft crew dispatched by a radio or paging system.
   d. Use a profit center charge-back system for all maintenance labor and material expenses. This system allows profit center managers to become aware of maintenance costs and to cooperate in seeking methods to reduce costs.
3. *Planning and Estimating.* Select planners or estimators knowledgeable in their craft and in maintenance procedures and techniques. A craftsperson-to-planner ratio of 20:1 to 25:1 is a realistic figure. Decisions to perform the work in-house or to contract should be firmed up early in the planning stage.
4. *Daily and Weekly Scheduling.* Schedule only those jobs which have the required materials, spare parts, and work hours currently available. Effective scheduling minimizes costs and maximizes productivity by lessening travel and idle time.
5. *Up-to-Date Tools, Equipment, and Methods.* Ensure that proper equipment and up-to-date tools are readily available to maintenance personnel. Improvement in methods should be the goal of every maintenance supervisor.
6. *Supervisory and Staff Training.* Appraise the entire operations and maintenance organization for the abilities, experience, aptitudes, and promotability of staff.
7. *Spare Parts and Materials Control.* Efficient control of spare parts and materials is essential for effective maintenance management. Through an inventory analysis, the important few items that should be controlled can be identified. The most economical method of ordering parts and materials should be followed.
8. *Worker Utilization Controls*
   a. Work order labor history records are essential for developing in-house standards.
   b. Work sampling techniques should specify where, what, when, and how.
   c. Equipment records permit identification and analysis of high costs and provide a basis for decisions to rectify conditions that contribute to excessive maintenance costs.
9. *Operations and Maintenance Manuals.* Systems-oriented manuals, complete with graphics, describe system design parameters, suggested operating modes, and recommended maintenance procedures to be followed for optimum performance. This management tool is effective in communicating accurate operating and maintenance information and can be used to determine full equipment life expectancy and to avoid expensive repetitive breakdowns.
10. *Performance Reports.* Weekly reports by the maintenance department in which the department's actual performance and estimated performance are compared assist the maintenance manager in determining backlog and manpower needs. Such reports also allow the manager to compare costs to national averages and to measure the overall effectiveness of the engineering management program.
11. *Work Measurement Standards.* On-site work standards combined with work sampling results establish effective facility standards. Work simplification methods, improvements, and training programs are further avenues for improvement in operations and maintenance management.

All elements are important to a successful engineering management program. Maintenance managers must analyze their own organization. Are these elements present in the organization? Are the managers reaping the full benefits from each element as originally expected? What changes are necessary to attain the expected yield from each element? The answers to these questions will indicate what elements require attention to improve the effectiveness of the organization.

Measurement of Program Effectiveness

After presenting a program such as the one described here, the question most often asked is, How can its effectiveness be measured? What parameters and guidelines can be used to indicate the effectiveness of the maintenance management program? Some helpful parameters and corresponding guidelines to measure effectiveness are:

1. *Work Request Generation.* If the maintenance management program is functioning properly and it has been sufficiently staffed, a minimum of 70 percent of maintenance work requests (normally received as written requests) should be generated by the maintenance department—primarily by preventive maintenance personnel.
2. *Planning and Scheduling Efficiency.* Realistically, it should be possible to prepare and implement a daily schedule so that a minimum of 80 percent of the scheduled work is completed at day's end. Work not completed will result from inaccurate estimations and emergencies beyond the capability of the day work force.
3. *Maintenance Overtime.* Preventive maintenance improves scheduling efficiency and increases equipment realiability. Consequently, overtime caused by urgent repairs should not exceed more than 6 percent of the total maintenance work hours available. However, overtime can exceed 6 percent for other reasons, such as:
   a. Shortage of workers
   b. Unrealistic completion dates
   c. Insufficient staffing of maintenance department to handle renovation work load
   d. A practice to increase workers' pay
   e. Low productivity caused by ineffective planning and scheduling
4. *Productivity.* With a smooth-running program, worker coordination delays such as idle time, waiting for material, talking, and avoidable travel time should be no higher than 15 percent to 20 percent when measured by a work sampling analysis. Taking into account unavoidable delays and travel, maintenance productivity should be in the 65 percent to 70 percent range.
5. *Backlog.* Backlog or planned work yet to be scheduled indicates how effectively the program is functioning. Because a primary objective of the program is to control maintenance work, backlog variance should indicate how well that control is being exercised. A backlog of two weeks plus or minus one-half week per person indicates good control. This means, for example, that a four-person carpentry crew should be working from a total maintenance backlog range of 240 to 400 work hours at any one time throughout the year.
6. *Unit Maintenance Cost (UMC).* Unit maintenance cost or cost per square foot of a manufactured item can also indicate the effectiveness of the maintenance management program. Assuming that the existing maintenance effort is acceptable to management, the UMC may be reduced by 10 percent to 25 percent once the effects of inflation on wages and materials are discounted. The reduction should occur over a period of nine to 18 months and will be the result of more effective utilization of personnel and material. However, if the existing maintenance effort is not sufficient, the UMC may not decrease but instead may remain constant or increase (if increases in manpower or wages are necessary to achieve an acceptable level of maintenance).

In summary, no single performance indicator—work request generation, scheduling efficiency, overtime, productivity, backlog, or unit maintenance cost—is a measure of the effectiveness of the engineering management program. However, measured and monitored collectively on a continuing basis, this group of indicators will provide a means of judging the overall trend.

Effective maintenance requires good management. Organizations with energetic and realistic management teams, willing to overcome misconceptions about the impossibility of improving maintenance performance, are proving that dramatic results can be achieved through team effort. The team approach is essential because of the need for composite skills that rarely exist in an individual. Engineering management programs require management skills combined with practical maintenance experience. Maintenance departments have some of the best and most able people in the facility. These people are willing, but they expect people in higher management to do their part to reduce delays, irritations, and useless work or travel time.

Maintenance improvement and cost reduction may be difficult but are not impossible to achieve. Good management requires measurement and control. Contrary to what people believe, maintenance operations are measurable and controllable. Good planning and scheduling, together with consistent job standards and current methods, can achieve major benefits for many organizations. These include savings of 20 to 40 percent in maintenance labor costs and superior equipment operating performance.

Costs for a Systematic Maintenance Management Program

Properly maintained school facilities provide appropriate support to the educational program and protect the public's financial investment. Wise expenditures for maintenance accomplish both purposes. Such expenditures are investments that ensure a clean, healthful, safe school environment. In addition, properly maintained school facilities last longer. School districts save money because facilities do not have to be replaced as frequently as those that are not properly maintained.

If a planned maintenance program is followed, about 5 percent of a district's operating budget will be required to provide an adequate maintenance program. In addition to the 5 percent expenditure for the district's maintenance program, a reserve fund is needed for unanticipated and emergency maintenance expenditures. Another criterion for determining budget requirements is to calculate 2.9 percent of the current net building replacement cost or a projected cost based on the square footage of property to be maintained.

Cost per square foot estimates vary according to the various conditions in each school district, particularly the size of the district; the sophistication of mechanical, electrical, and structural systems; design layout; carpeting versus hard-surface floors; and other factors.

Districts using average daily attendance or average daily membership as a basis for determining maintenance costs are using an indirect method of determining budget requirements and may be underestimating their maintenance budget needs.

The costs of preventive maintenance are to be included in the costs for the total maintenance program. To determine the cost of preventive maintenance and to determine whether or not it is economically sound require an analysis of various parameters. Generally, it is economically sound to implement preventive maintenance when the cost preventive maintenance (Cpm) is less than the cost of total maintenance (Ctm). (Total costs include replacement costs, costs of downtime [or lost services], and deterioration and normal depreciation.)

Figure 15 illustrates the relationship between the cost of preventive maintenance and the total maintenance cost.

As the preventive maintenance cost curve increases, the downtime cost decreases; but the total maintenance cost can increase or decrease. The point at which the preventive maintenance cost curve (Cpm) and the downtime cost curve (Cdt) minimize total cost is the optimum point that determines the amount of preventive maintenance. Collection of historical data is the most realistic way to develop the information necessary to determine the optimum point.

Effective Organization

How effectively a school facility is maintained may well be determined by the district's entire managerial and organizational pattern. Adequate planning, trained personnel, and efficient management are essential. No two school systems are alike in all their departmental requirements; therefore, the managerial and organizational patterns of maintenance functions in different schools may vary. In organizing the district's maintenance program, managers should consider the work volume, division of the work force, performance standards, types of programs, and student and community needs.

It is not always easy to decide whether a job is a maintenance function or an operations function. In one school district with a maintenance department and an operations department, the replacement of a fluorescent tube may be considered an operations procedure and may be done by a custodian; but in another district this task may be done by a maintenance person. Some administrators feel that the assignment of minor routine maintenance duties to custodians increases productivity and decreases labor costs per unit of service. Others hold that maintenance and operating efficiency as well as employee morale are improved if all maintenance work is done by maintenance personnel and all operating tasks are performed by custodians. Maintenance administrators should establish a definite procedure as to which duties are assigned to the maintenance division and which duties are assigned to the operations division. Because no two school systems are alike, one plan or organization will not fit all situations. The division of labor according to work specialization is determined by local conditions, and these conditions should be evaluated before decisions that apply to school maintenance are reached.

In an attempt to determine the exact amount of work required to keep all facilities in a satisfactory state of repair, it may help to list and evaluate the several elements that constitute the work load. Among these elements are (1) size of school systems; (2) useful life of facilities; (3) types of building materials and finishes; (4) use of facilities; and (5) district staff labor or contract maintenance. These elements may not be of equal importance in all districts.

Size of School Systems

In a medium-sized system all maintenance, custodial, gardening, and related services are usually better placed under one administrator whose title may be director of maintenance and operations. In larger systems, however, it may be feasible to set up two separate divisions—one for maintenance and one for operations—each with a director responsible to the district superintendent of schools through the business manager.

In small districts, assigning separate personnel for each division may not be feasible. In such cases greater flexibility in job duties and in the training of personnel will be necessary so that some maintenance work can be done by the operations staff. Major maintenance and repair work can be contracted to local firms. Regular district personnel who do not have year-round employment may be assigned to summer maintenance crews.

Useful Life of Facilities

Facilities do not all deteriorate at the same rate, but age does result in deterioration and accelerates maintenance problems. For the first few years of the life of a new facility, major maintenance may not be required, but correction of design and construction deficiencies may be necessary. As the facility ages, maintenance needs will accelerate. After 15 or 20 years, a new roof may be needed; or other exposed parts may need to be replaced. The 15-to-30-year cycle usually represents the end of the useful life of some mechanical features of the facility, such as the heating and plumbing systems, and replacement may be imperative. After 30 years, buildings are generally ready for a major overhaul and renovation and may require replacement of structural components, such as floors, exposed doors and windows, and stairwells.

It is recommended that an additional 2 percent per year be budgeted for maintenance items that are classified as major and are expected to occur within a ten-year to 50-year period after construction. This budgeted amount would provide for the rehabilitation or modernization or both of existing buildings for projects identified in the school district's long-range comprehensive master plan.

School buildings and all auxiliary components have been assigned a computational life span of 50 years. School districts are allocated a percentage of current replacement costs of buildings for such purposes. For the purpose of calculating the maximum allocation per building, the following percentages apply:

1st through the 20th year—5 percent of the first ten years plus 1 percent per year from the eleventh through the twentieth year provided that no allocation of such funds shall be made during the first ten years.

21st through the 30th year—15 percent plus 1 percent per year from the twenty-first through the thirtieth year

31st through the 40th year—35 percent plus 3 percent per year from the thirty-first through the fortieth year

41st through the 50th year—65 percent plus 3½ percent per year from the forty-first through the fiftieth year

The computational life span of a building should be extended after rehabilitation or modernization in the direct proportion that such cost bears to the current replacement cost of the building. For computational purposes in allocating funds for rehabilitation or modernization of buildings or both, a computational life span of 50 years is used from the time of original construction or from the time of complete reconstruction.

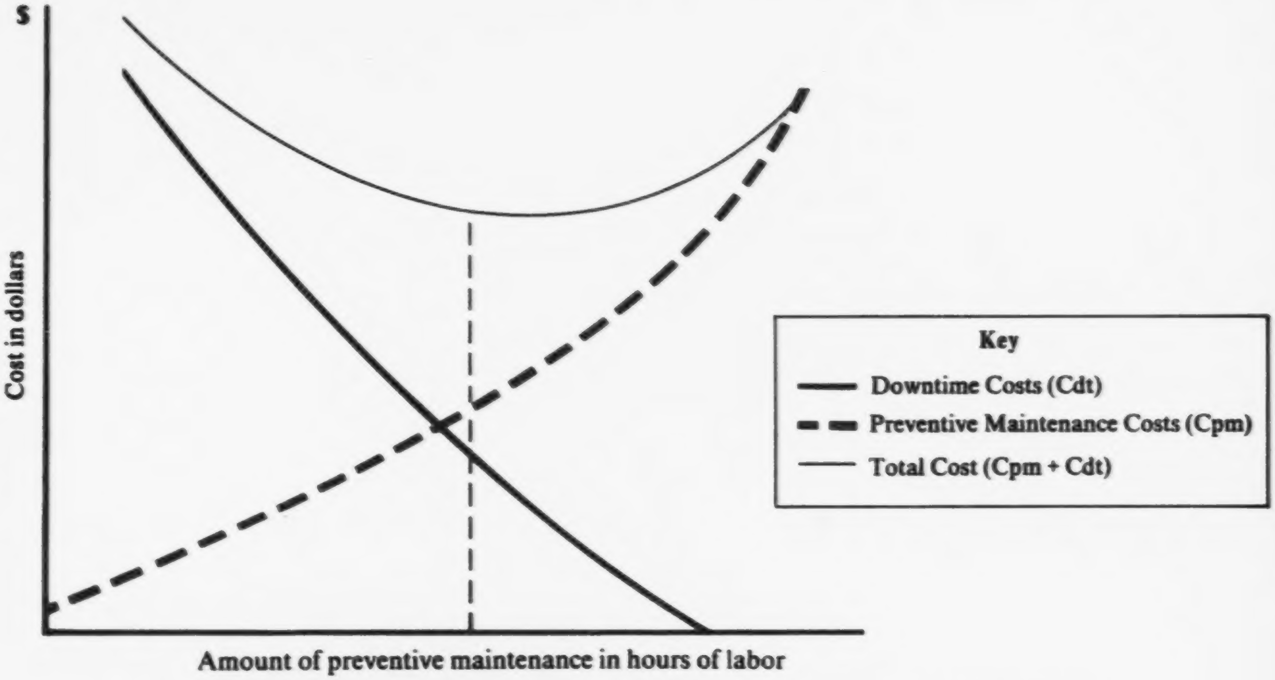


Fig. 15. Economic graph for determining the frequency of preventive maintenance

Types of Building Materials and Finishes

Many maintenance problems result from the use of low-quality construction materials and finishes. The low initial cost of facilities that have been constructed with low-quality materials frequently represents only a small down payment when compared with total maintenance costs incurred during the life of these buildings. Quality materials may cost more at the time of construction but will bring dividends for the district through longer wear and low maintenance costs. High initial cost with longer wear and low maintenance generally proves to be more economical than low initial cost with high maintenance. Low maintenance and the lowest cost per life cycle consistent with the needs of the district should be a goal of any school construction project.

Use of Facilities

In many communities the local school facilities are frequently used for activities unrelated to the educational program. For example, school playgrounds are often a gathering place for children who use the grounds and equipment for play and informal athletic events. The extent to which buildings are used affects maintenance needs. When facility utilization is limited to the regular school program, maintenance needs will be fewer than if community groups use the buildings after school hours. Before committing a facility for community use, the sizes of the groups, required supervision, and hours of use need to be considered. When community use is extensive, additional maintenance hours are required to maintain floors and other areas affected by the additional use.

District Staff Labor or Contract Maintenance

The design of the district's maintenance program should be based on one of the following practices: (1) majority of maintenance to be done by a district maintenance staff; (2) majority of maintenance to be done by contract; or (3) maintenance to be done through a combination of staff and contract. The organizational pattern of the school maintenance program is directly related to policies established by the school district. Whatever type of program the district adopts, all work should be coordinated in an easy flow of efficient services.

Scheduled Maintenance Program

Planned maintenance can be described as the minimum expenditure of time and money to ensure maximum life of a facility or piece of equipment with a minimum amount of repairs, replacement, or loss of use. Stated in a different way, planned maintenance is the generic term that is applied to all the various scheduled maintenance programs. The goal of planned maintenance is maximum benefits at lowest cost and is the result of developing, budgeting, and instituting the periodic, recurring, and replacement schedules.

Scheduled maintenance consists of the projected, timed operations that supervisory staff use to distribute the necessary maintenance work evenly throughout the year or for a longer period of time. Scheduled maintenance permits the supervisory staff to choose the most cost-effective time for completing the work and helps avoid the cyclical nature of an unplanned program.

A sequence of events should lead to the completion of maintenance projects. At the same time, certain records or data should be produced. These records form the historical data for future similar operations and for anticipating future budgetary requirements. Maintenance records should produce an accurate depiction of costs for materials and personnel and demand minimum time and effort from the staff.

Unless specific requirements at each school are known, a district will not be able to develop a well-planned, efficient, low-cost maintenance program. In large districts maintenance needs may be established periodically through technical and nontechnical inspections and surveys. However, small districts cannot usually organize, staff, and administer maintenance departments according to this procedure. In these small districts civic clubs, parent-teacher groups, community improvement leagues, or other organizations that are interested in various aspects of the school maintenance program may be called on to help evaluate the needs of the school. Representatives from civic organizations can be organized into inspection teams to perform the functions of the nontechnical committee. These teams, working cooperatively with principals and other district personnel, inspect and evaluate facilities usually once a year. If such inspections reveal maintenance needs, the needs are itemized and cost estimates are made. After the recommendations are approved by the district superintendent, the governing board is requested to provide funds to meet the recommendations. Such provisions would be included as part of next year's budget.

Although the procedure described above may be successful in providing adequate maintenance for some schools, it is not normally recommended as an alternate maintenance budgeting procedure because communities that lack technical leadership may fail to allocate enough of the available resources for maintenance. However, each school should make the best use of available resources to conduct periodic inspections so that maintenance can be accurately scheduled.

A maintenance program should be specific enough to use the time and skills of all employees effectively. In addition, it must be broad enough to cover all maintenance categories and flexible enough to cope with unexpected emergencies. Each major maintenance activity should be timed to become part of a long-range master schedule, and work should be distributed equitably among the maintenance crews.

With these objectives in mind, the maintenance manager should keep a master list of all maintenance tasks and repair jobs that are to be done. Each job should be given tentative starting and completion dates, and various tasks should be assigned to members of the maintenance staff.

Maintenance Shop Needs

Board policy, size of the district, and services rendered by the maintenance staff impose certain requirements on the maintenance shop and the shop's equipment. If the district is small, has no organized maintenance program, contracts most of its maintenance work, and requires only routine service from the maintenance staff, it will have little need for a maintenance shop with specialized equipment. On the other hand, larger districts may need special shops and an assortment of tools and equipment to provide prompt and economical service.

In districts where such shops are needed but have not been established, careful attention should be given to the type, size, and location of the shop and to the shop equipment. There is no justification for elaborate shop facilities in small districts where work volume is small, maintenance staff is limited, and only minor repairs are made. In such districts a rolling shop, which consists of a covered-bed truck equipped with necessary tools, may be adequate. Another type of shop is the custodial or maintenance shop located in each building. Another alternative is establishing one general shop with units for special types of repair jobs, such as those involving electronics, furniture, office machines, welding work, electric motors, and hardware. This alternative may be more suitable in some districts.

In large districts in which the volume of work is heavy in each of several different repair categories, one shop for each area should be planned. For example, a bus maintenance shop and storage garage should be maintained as a separate unit for a pupil transportation system. If furniture repair is a large operation, it may be done in a separate shop. Three or four shops, each designed to provide for a number of related repair and maintenance operations, can be advantageous. For example, all repairs and maintenance work involving the use of metals should be done in one shop equipped to handle, store, cut, weld, and fabricate metals; wood items should be maintained in a carpentry shop; motor vehicles should be maintained in an auto mechanics shop; and repairs concerned with electrical equipment and electric services should be performed in an electrical shop. Regardless of the type of shop, outstanding economies in facility maintenance and operations are achieved in districts where maintenance shops are operated.

A shop's size influences a shop's efficiency and should be taken into consideration when a maintenance shop is planned. Sufficient room for storing supplies, for items brought in for repair, and for repaired items should be allowed. Work areas should be comfortably large and provide adequate room for machinery and equipment and for employees' toilet, shower, and dressing facilities.

A shop's location also influences efficiency. A shop should be centrally located and should be easily accessible for delivery of equipment. Labor hours, gasoline consumed, and cost of wear and tear on trucks in transporting equipment long distances to and from repair shops can account for much of the maintenance dollar. If field crews assemble at the shop each day to be driven to facilities where maintenance work is in progress, travel time is spent. How much time depends on how strategically the shop is located. Access to rail heads, major arteries, and supplies should be considered when deciding on where to locate the shop. Shops should be located so that the distance required to transport materials and supplies is kept to a minimum.

The maintenance department cannot be expected to make needed repairs or to perform essential maintenance services unless its equipment and tools are appropriate for the job. In general, tools and tool equipment may be classified as on-the-job, portable, fixed, and hand-manipulated. Portable tools, which may be hand-operated or powered by motors, include electric drills and grinders; power handsaws and planes; spray-painting equipment; mowers; floor scrapers and sanders; welding equipment; and forges.

Fixed equipment is any item that is too heavy to be moved readily from place to place. Safety regulations require that most of these be properly bolted to the floor. Examples are bandsaws, table saws, planers, jointers, drill presses, and lathes.

Hand tools are those that can be carried from place to place. Most depend on hand manipulation for service. Examples are hammers, saws, planes, wrenches, screwdrivers, nail punches, drills, and levels.

Experience dictates that all portable tools and fixed tools should be furnished by the district. Practices differ regarding hand tools. Local practice may be followed in deciding whether such tools are to be furnished by the district or by the employee.

Annual Inspections

The annual inspection normally provides the only thorough physical check that is made of the entire school facility and its components, equipment, furnishings, and grounds during the year. Information gathered from this annual inspection is incorporated in the scheduled maintenance program. This information will also enable the director to estimate costs and draw up budget recommendations for the coming year.

Inspections should be ongoing. With proper ratios of supervisors to workers and with good planning and scheduling time, the supervisors and technical staff members can perform this annual inspection without disrupting other equally important duties.

It is essential that the inspection be done by highly competent staff members. In a large school district, neither the director nor the maintenance or operations supervisor can inspect every part of the school facility. In large districts the team inspection plan should be utilized. The supervisor acts as team captain for inspections of those portions of the facility and grounds maintained by his or her staff. The director makes spot inspections and also inspects areas requiring special attention. Of primary importance are those areas in which larger than normal expenditures will be budgeted for maintenance and repairs.

Crafts personnel can be called upon to assist in inspections within limits. But it would be poor practice, for example, to have the heating and ventilating repairer who conducts monthly preventive maintenance and safety checks on a boiler plant to conduct the annual inspection. The immediate supervisor of this repairer should conduct the annual inspection. The repairer may assist.

The survey team should be provided with forms that can be used in making annual inspections. One of the forms should be a checklist. The forms should provide the following data: facility's name; construction date; dates of major remodeling and additions; probable life expectancy of the existing structure; grade level for the school; and the survey date or dates and names of members of the survey team.

The checklist should contain space for item identification, comments on present condition, notes as to what is needed, estimated cost for labor and materials, estimated date on which the repairs or replacement will be needed, priority recommended, and remarks. Separate forms may be used for sites, facilities, and equipment. The following is a suggested checklist of items under those three categories:

- *Sites*

  Play areas (surfacing; play apparatus; safety)
  Pedestrian traffic (sidewalks; covered passageways; steps; ramps; safety)
  Vehicular traffic (driveways; loading platforms; parking; site entrances and exits; safety)
  Lawn improvements (turf; shrubs; flowers)
  General (fences; drainage; erosion control)

- *Facilities (exterior)*

  Roof (coping; parapet; flashing)
  Projections (skylights; vent pipes; ventilators)
  Gutters (downspouts; roof deck; roof mat)
  Walls (masonry; concrete; stucco; curtain wall)
  Above grade (cornices; sills; joints; windows; window caulking; putty and sash; ventilators)
  Below grade (foundations; footings; window wells; joints between walls and sidewalks)
  Doors and hardware

- *Facilities (interior)*

  Structure (ceilings; walls and partitions; floors; stairs and stairwells)
  Finishes (plaster; paint; tile)
  Light and light control (electric wiring and fixtures; windows; shades and blinds)
  Plumbing (sinks; drinking fountains; water closets; urinals)
  Heating and ventilating (boiler; motors; ducts and fans; radiation; automatic controls)
  Built-in equipment (chalkboards and tackboards; curtains and tracks; pulleys and ropes; stage and gymnasium equipment; lockers; auditorium seats)

- *Equipment*

  Shop (industrial arts; auto mechanics; electronics; agriculture)
  Business education (typewriters; office machines; other)
  Home economics (stoves; sewing machines; other)
  Audiovisual (projectors; screens)
  Cafeteria (stoves; refrigeration; ovens; mechanical ventilation; tables)
  Science (cabinets and storage vaults; laboratory tables; display cases)
  Furniture (students' desks and chairs; teachers' desks; bookcases; office furniture; library tables)

The survey team members should enter the required information on the checklist and record the equipment's present condition as excellent, good, fair, or poor. They should add any comments that will make the record complete. Before leaving, the entire survey team should carefully evaluate the survey's results. At this time the team should reexamine areas about which there may be differences of opinion. Based on the evaluation, priority ratings should be assigned to each item needing maintenance; repairs most urgently needed should be rated 1; those that prolong the life of the building and equipment should be rated 2; and others that are desirable should be rated 3. The recommendations of the survey team will be reviewed and approved or amended in accordance with budgetary policies and funds available.

Changes in curriculum, reorganization of classrooms, updating of teaching methods, inauguration of community programs for which school buildings will be used, or reorganization or transformation of facilities should also be considered when conducting the annual survey.

The recommendations and requests concerning these areas should also be presented for approval and incorporation in the total district maintenance budget.

Types of Work Orders

Each budgeted major maintenance project approved by the governing board is implemented by a formal project request initiated by the director of maintenance and operations. The request should contain a comprehensive description of the project. Original estimates, routing instructions, comparison costs, materials, plans, and specifications should be incorporated in and become a part of the original requisition.

The project request form should be given to the supervisor of maintenance, who should carefully compare his or her estimate with the original estimate. At this time changes or other recommendations should be made. If the project is large, the necessary steps for completion should be planned at this stage.

Once the project is reviewed and the request is approved, the supervisor of maintenance should prepare a work order. A description of the job and other necessary data, along with detailed cost estimates, should be included. This work order becomes the directive for the maintenance supervisor or the principal trade supervisor to implement the project. The work order necessitates that priorities be established, materials be ordered, subcontractors be contacted, labor forces be organized, and the final work be scheduled (see Figure 16). According to the proposed expenditure, work orders should be either capital outlay work orders or service work orders.

Capital Outlay Work Orders

Capital outlay projects are major projects not considered part of normal ongoing maintenance. These are projects that involve improvement, renovation, addition, or major rehabilitation. In accounting terminology these are capital outlay charges in the budget. Such projects are not charged to the normal general fund maintenance budget.

A capital outlay project that is listed specifically in the budget, such as a scheduled addition, improvement, or rehabilitation, should be initiated by a capital outlay work order. This work order should accompany the job from beginning to end and will become the school principal's record as well as the record of costs for both the maintenance and the accounting departments. This work order eventually contains the complete record of materials, labor, and subcontracts and is used by the director of maintenance and operations to record the completion of the project.

Capital outlay work scheduling may be developed through a program of technical and nontechnical inspections and surveys. These inspections should establish the amount of work that is necessary to maintain the facilities at the level indicated by the governing board.

Once the inspections have been held and the work load established, these expenditures should be included in the budget. When the financial allocations are tentatively distributed, the estimated work load should be presented to the governing board as a part of the district budget. The work may be scheduled as soon as the budget has been approved and adopted.

Service Work Orders

Service work orders are issued for normal maintenance repairs or for other maintenance tasks. Such orders are issued for (1) miscellaneous minor repairs found necessary by technical inspection; (2) repairs necessitated by minor vandalism; (3) the summer work load of minor repairs in the classrooms; and (4) routine daily repairs that cannot be accomplished at the custodial level. Usually, this type of work represents necessary repairs that have been identified in the annual inspection or requested by the principal. Service work orders are normally used only for repair items, not for alterations or new construction.

The budgeting for such work is usually accomplished by placing a lump sum in the budget to cover necessary expenditures. The amount placed in the budget should be based on past experience, plus other known factors, such as the age of facilities, increased costs, or anticipated repairs.

The processing of a service work order should be kept as simple as possible. If more than one trade is involved, the service work order should be submitted to the supervisor of the leading trade, who will schedule the work for his or her staff and the staff of other trades. In this manner the responsibility for scheduling and inspecting the work and for signing the completed work order will remain with an individual. The accounting procedures should also be simplified, yet still provide proper audit control. Unnecessary paper work and cost accounting can quickly exceed the cost of minor repair jobs.

For proper control a maximum dollar limit should be placed on work authorized by service work orders. This limit will serve as the dividing point between the simplified service work order and the more formal capital outlay work order. This limit should not apply to a true emergency that must be corrected to protect the safety and health of the school's occupants.

The key to effective control and efficient accomplishment of minor repair jobs rests with those autho-

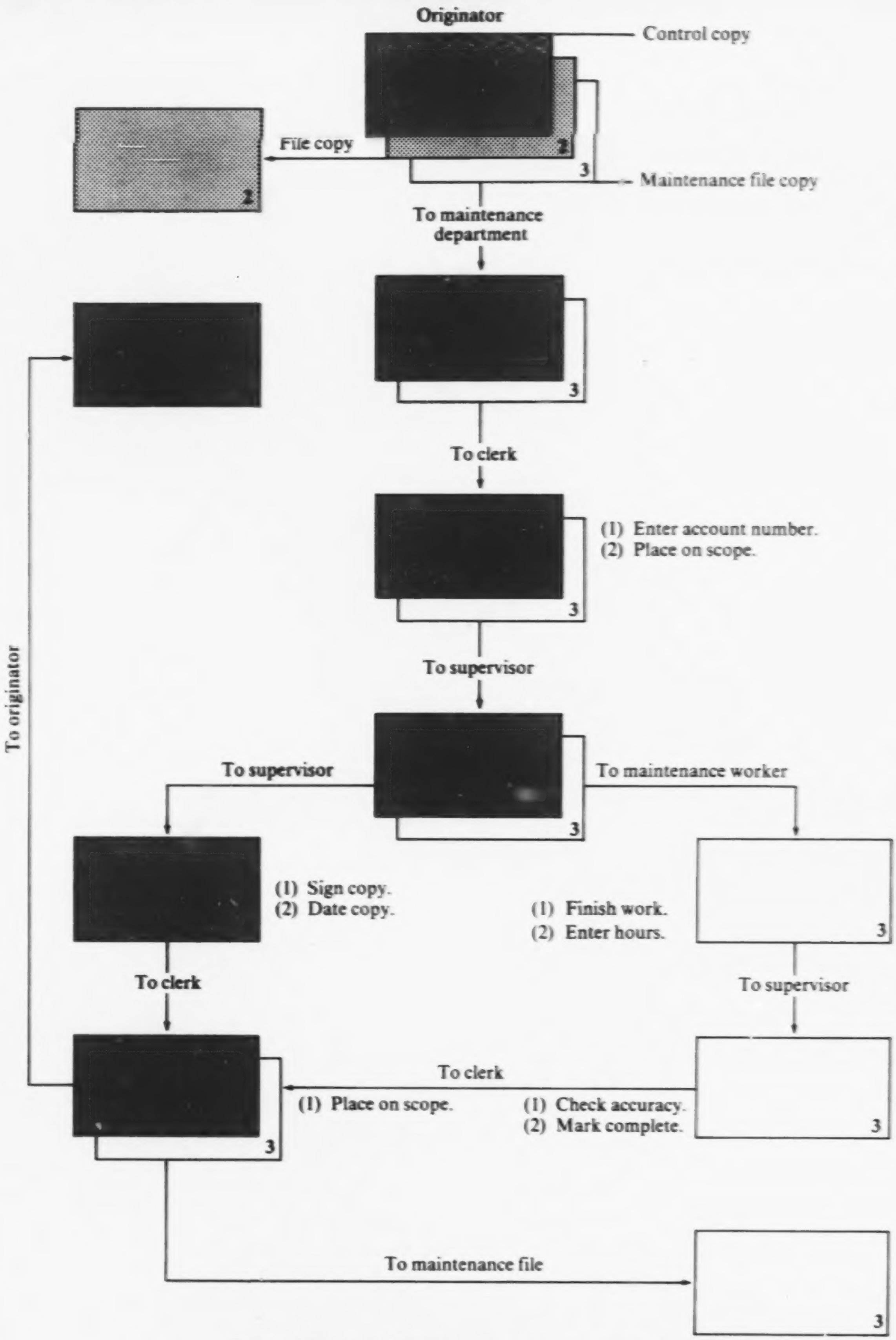

Originator
Control copy
File copy
2
2
3
Maintenance file copy
To maintenance department
3
To clerk
3
(1) Enter account number.
(2) Place on scope.
To supervisor
To supervisor
To maintenance worker
3
(1) Sign copy.
(2) Date copy.
(1) Finish work.
(2) Enter hours.
3
To clerk
To supervisor
To originator
To clerk
(1) Place on scope.
(1) Check accuracy.
(2) Mark complete.
3
3
To maintenance file
3

Fig. 16. Flowchart illustrating maintenance work orders

rized to request such repairs, with the maintenance account clerk who prepares the service work order, and with the shop supervisor who schedules the work. Only the school principal or designee, school head custodian, or maintenance supervisor should be authorized to initiate service work orders. The maintenance account clerk must be aware of what constitutes an authorized routine repair and must be familiar enough with school construction and maintenance to define properly in writing the work to be accomplished.

Work Orders for Emergency and Unanticipated Work

Major work may be necessary because of an emergency. Often the cost of this work exceeds the maximum allowance set by the governing board and cannot be paid for out of the lump-sum allocation for small jobs. The work that cannot be paid for out of the lump-sum allocation for small jobs is designated emergency and unanticipated work and must be approved by the board and paid for out of the undistributed reserve appropriation. An example of this type of work is a repair job requested by the fire marshal. After the need has been established, the director of maintenance and operations should estimate the time and materials necessary and send the estimate to the governing board with a request for approval. After funds are approved by the governing board, the work should be scheduled on a capital outlay work order.

Control of Maintenance Costs

Rising maintenance costs may be amply justified in view of inflation and the fact that maintenance goals have to be met. Still, careful attention must be given to the major factors that influence such costs so that they can be controlled. A discussion of these factors—good maintenance practices, continuous evaluation, and good recordkeeping—follows.

Good Maintenance Practices

Good maintenance practices may include: planning and following a schedule of preventive maintenance; organizing workers according to job skills; establishing work sequences; negotiating service contracts; and using central maintenance shops.

Planning preventive maintenance. Managers who plan for preventive maintenance recognize a normal life span for components of buildings and equipment and attempt to anticipate the failure of these components through regular inspections. By keeping records and developing standards, managers can determine the point at which the component has given its maximum benefit at the lowest overall cost. This procedure can also protect the district from disruptive failure of components and the subsequent shutdown of facilities.

Following a schedule. To schedule facility maintenance means that the entire program is planned in advance, with recurring periodic replacement; grounds and sites improvement; and emergency maintenance given proper perspective in the overall master schedule.

Organizing workers according to job skills. Organizing workers according to job skills is the most effective way to improve efficiency. Maximum output can be obtained if workers are organized according to conventional trades such as carpenter, electrician, painter, plumber, and machinist. Performance standards are improved when workers are assigned to their respective areas of specialization. However, in emergencies all workers are expected to assist in making repairs.

Establishing work sequences. Tasks should be accomplished in logical order so that the work may proceed smoothly. For example, in an interior renovation the work on ceilings and light fixtures should be accomplished first, then work on walls and woodwork, doors and windows, and chalkboards and tackboards. Work on floors and floor coverings should be done last.

Negotiating service contracts. Most service contractors are prepared to service equipment that they sell. In some instances they offer annual service contracts at a nominal cost. The contracts usually obligate the vendor to answer service calls and provide labor, but not replacement parts, at stipulated annual fees. For complicated equipment the district may find that it is more economical to make such service arrangements rather than undertake the work in its own maintenance department.

Using central maintenance shops. Central maintenance shops have proven advantageous in medium to large districts where most maintenance functions are performed by district personnel. Such shops should be of adequate size and appropriate type; they should have proper tools in sufficient quantity to do all required work and carry a supply of materials and parts to meet normal requirements.

Continuous Evaluation

No maintenance program is perfect in every detail. Managers are obligated to make improvements or eliminate imperfections as they become evident. Evidence that improvements are needed may be obtained through accumulated experience; continuous evaluation of techniques, practices, and performance standards; and administrative procedures related to maintenance. The overall result of such evaluation should be improved maintenance services.

Good Recordkeeping

Adequate recordkeeping is the only way to control expenditures in any program. It is the first step in reducing maintenance costs. The purpose of recordkeeping is to supply useful information regarding services. Records provide a history of property and equipment and are a current source of reference concerning details of work to be performed. They establish accurate data for cost estimates and are of value to managers in securing appropriations for the maintenance budget. More sophisticated management information systems using computer technology are available for maintenance departments. Even small districts should consider the advantages of using computers as part of the total maintenance operation.

The services rendered by the maintenance department will determine the type and manner of recordkeeping. In order to establish a good system of maintenance records, the director of maintenance and operations should decide the type and scope of the records and then establish the line responsibility for keeping them. Maintenance records for districts with extensive maintenance services fall into three basic categories: inventory, cost, and contractual records.

Inventory records. The district's maintenance inventory is a list of all property, equipment, furniture, and maintenance supplies and is intended to account for these items with respect to type, quantity, location, condition, and value. It should include the following:

- Sites and playground apparatus
- Buildings and contents
- New and reconditioned furniture and equipment stored for future use
- Fixed and portable maintenance equipment, usually stored in the maintenance shop
- Warehouse maintenance supplies, such as varnishes, paints, hardware, doors, windows, glass, replacement parts, fixtures, and equipment
- Transportation vehicles

Cost records. Cost records are initially entered on a regular job sheet and may be transferred to permanent forms when the job has been completed. The completed job sheet should contain the following:

- A description of the job
- A list of all materials used
- The type and amount of labor
- Number of miles traveled to and from the job (using maintenance shop or headquarters as the point for departure and return of employees)
- Estimated cost of job
- Dates showing when the work was started and finished
- Date and cost of job, if done previously
- Total cost of the current job, with breakdown of labor and materials

The quantity, brand name, company where purchased, order number, company invoice number, and cost of all materials used on the job should be shown. If any materials come from warehouse stock, the requisition number and cost on the job sheet should be substituted for the order and invoice number.

The type and amount of labor will include such information as name and classification of workers, hours worked, hourly wage rate, and total wages paid to each employee.

By keeping cost records, managers can make comparisons between the cost of work performed by maintenance crews and work contracted out. Data contained in such records can serve as a basis for making cost estimates for future jobs. Employees' efficiency will improve because managers and workers know that a check is being made of their work. Over a number of years, job frequency can be established. Finally, community and board of education relationships may improve because evidence will be available to show that funds have been spent wisely.

Contractual records. Some maintenance jobs can be completed at lower cost by using outside contractors than by using the maintenance department. An example is the replacement of a roof. This type of job is generally awarded to a local contractor on the basis of a competitive bid. Managers should require bid bonds and execute a written contract with the successful bidder. This contract should be complete and should cover essential relationships and obligations. The board may find it necessary to protect itself and the district by requiring that the contractor furnish performance, warranty, and surety bonds as well as liability insurance. The documents, along with working plans and specifications, become a part of the district's maintenance record.

Responsibility for maintaining records. The data contained in maintenance records can be used for a number of purposes. They are particularly valuable in the justification of a budget. For this purpose alone, recordkeeping is so important that responsibility for this task should be determined by the assistant superintendent, business manager, or director of maintenance and operations. In some districts having an extensive maintenance program, principals are responsible for equipment inventory records in their individual schools; the warehouse supervisor is responsible for warehouse inventories; the maintenance shop supervisor is responsible for shop inventories; and the maintenance supervisor is responsible for portable maintenance equipment inventories.

Chapter 4

Managing School District Operations

The physical condition of school facilities reflects the values of the community as interpreted by the school district governing board and implemented by the school district staff. Safe, comfortable school facilities that are clean and sanitary are essential to a successful educational program. School facilities that are well cared for and present a pleasing appearance enhance the whole educational program, support the community's concern for education, and protect the taxpayers' investment.

The superintendent is responsible for integrating in the district's educational program the values identified by the governing board. In addition to educational standards, the superintendent should establish standards related to facilities operations that support the board's policies. District staff members should implement the policies and standards adopted by the board to establish uniform custodial and groundskeeping practices among schools and to assist the operations manager in evaluating the operations program.

The operations phase of facilities management includes those daily and regular services and activities necessary to keep the facilities open and in appropriate operating condition. Operating a heating and cooling system, cleaning classrooms, washing windows, and maintaining the grounds are operations activities. The operations phase differs from the maintenance phase in that the latter includes activities required to repair school property, such as replacing school equipment.

Goals and Objectives

The goals and objectives for the administrator of an operations department are derived from the philosophy and policies established by the governing board. The major goal is to implement an appropriate operations program to accomplish services in accordance with the board's policies in an efficient, cost-effective manner in support of the educational program. Objectives necessary to accomplish this goal should be established in all organizational components of the operations department.

Custodial Operations

The lines of authority for administering custodial operations vary among school districts. Some school districts assign primary responsibility for administering the custodial program to the director of maintenance and operations; others, to the principals or site managers. Most likely, however, the administration and operation of the district custodial program is a responsibility shared by the principals and the district maintenance and operations organization. When shared, responsibilities should be clearly defined and understood.

Administration by Principal

As the administrative officer of the school, the principal or site manager is often given the responsibility for supervising, evaluating, and scheduling the work performed by the custodial staff. (Custodial staff members are usually assigned to specific sites or buildings.) If the district assigns the building principal to be the site administrator, other staff services may be provided by the district manager of operations. These staff services could include technical supervision and budget control for operations in the building. Other districts may determine that the custodial operation is the responsibility of the business office. Many districts

OPERATIONS CHECKLIST

Questions that can be asked to determine whether the operations organization contains the elements needed to accomplish the goals and objectives of the district are as follows:

1. **Do district policies define the desirable levels of operation in sufficient detail to establish the budget?**
2. **Are established formulas utilized for the staffing of custodial and gardening operations?**
3. **Are custodians functionally responsible to school principals or to the district custodial manager or some combination thereof? Has this functional line of authority been clearly defined?**
4. **Are periodic and documented evaluations made of the condition of buildings and grounds of each school?**
5. **Is there a manual of operations for custodial and gardening services?**
6. **Is there preservice and in-service training for operations personnel?**
7. **Are operations crews utilized on a centralized districtwide basis or decentralized school site basis as appropriate?**
8. **Do custodians accomplish limited maintenance work as part of their normal responsibilities?**

BEST COPY AVAILABLE

use a combination of these two approaches. Whatever approach is used, a line of authority should be established and should be clearly understood by all. The members of the custodial staff should know who is responsible for the supervision, evaluation, and scheduling of the work to be performed.

Administration Through Shared Responsibility

In recent years school district administration has been sometimes referred to as participatory or decentralized educational management. This concept indicates that the superintendent assigns the direct or line management responsibilities for the total site educational program to the principal. The principal has complete administrative authority and responsibility. The district custodial management personnel are assigned technical responsibilities in support of the site program.

Under such a concept the functional line of authority for custodians flows directly from the site manager. The site manager includes the custodian as part of the school staff but does not manage the custodial staff in the specialized technical aspects of their custodial responsibilities. The site manager would be responsible for functional management of the custodian, and the district custodial supervisor would be responsible for technical management. This shared responsibility for custodial maintenance can produce a very effective operation.

Functional management involves the determination by the principal of what custodial tasks are performed and when they will be performed. As part of the school site team, the custodian performs tasks necessary to carry out the educational goals. These tasks are usually outlined in a work schedule established by the principal, district custodial supervisor, and the school's head custodian.

Technical management is the management of custodial tasks and the methods, equipment, and supplies used at the school site to keep the school sites clean, sanitary, and comfortable for the students and staff members. Included are technical aspects, such as how to vacuum and sweep, how to shampoo carpets, what chemicals to use, what equipment is best, and what the most cost-effective methods are. The custodian performs under the training and guidance of a technically knowledgeable and experienced district custodial supervisor.

This system of shared responsibility for custodial operations is designed to provide a technically trained crew that is highly supportive of the educational program under the functional management of the school principal. It is also designed so that the principal does not divert time from the education of students by having to manage the administrative details of custodial recruiting; technical screening; paperwork processing; management of substitute custodians; technical cleaning procedures; and techniques, chemicals, supplies, and equipment for the cleaning and sanitation process.

Under such a system of shared responsibility, the goal of custodial operations is to provide successful and cost-effective custodial operations in a healthy, safe, and comfortable environment designed to enhance the educational process. This encompasses the following specific objectives:

1. Clean and sanitary schools
2. Optimum efficiency and cost effectiveness in maintaining high standards of cleanliness and sanitation
3. Custodial operations highly supportive of and responsive to the educational process
4. A custodial management system encompassing optimum responsiveness and support to the educational process through participatory management by the principal and the district supervisor of custodial maintenance services

Under such a shared responsibility system, the district custodial supervisor might provide the following services:

1. Custodial recruiting, screening, and selection
2. Custodial staff development
3. Districtwide technical administration and evaluation of custodians
4. Determination of custodial staffing requirements by conducting a task/time/work standards analysis
5. Design of custodial work schedules at school sites in conjunction with the principal and head custodian
6. Hiring, managing, and training of substitute custodians
7. Communication and support to principals on custodial operations
8. Maintenance of custodial equipment
9. Research of new equipment and supplies
10. Management of district custodial supplies inventory
11. Sanitation and environmental control
12. Twenty-four hour availability for emergency situations
13. Custodial maintenance projects
14. Installation of equipment and supplies in new facilities

Figure 17 illustrates a custodial operations organization under a shared responsibility system.

The supervisor of maintenance and operations may be assigned the direct line of authority for district custodial operations, and the principal may be given an indirect line of authority through the supervisor of maintenance and operations. Under this arrangement

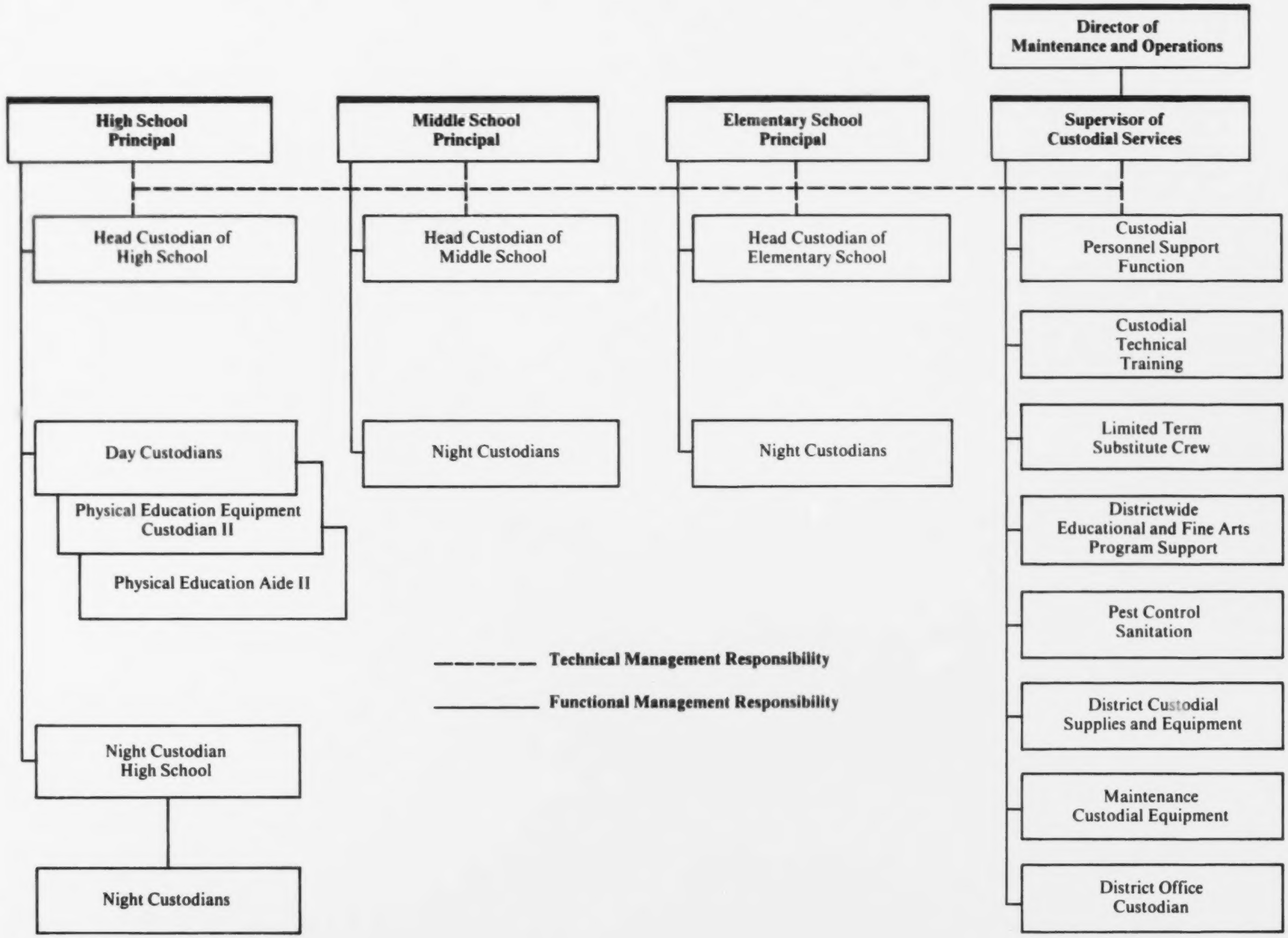

Director of Maintenance and Operations
High School Principal
Middle School Principal
Elementary School Principal
Supervisor of Custodial Services
Head Custodian of High School
Head Custodian of Middle School
Head Custodian of Elementary School
Custodial Personnel Support Function
Custodial Technical Training
Day Custodians
Physical Education Equipment Custodian II
Physical Education Aide II
Night Custodians
Night Custodians
Limited Term Substitute Crew
Districtwide Educational and Fine Arts Program Support
Pest Control Sanitation
Technical Management Responsibility
Functional Management Responsibility
District Custodial Supplies and Equipment
Night Custodian High School
Maintenance Custodial Equipment
Night Custodians
District Office Custodian

Fig. 17. Unified school district custodial operations organization shared responsibility system

it is the responsibility of the supervisor of maintenance and operations to:

- Schedule the work of head custodians and custodians, including:
  1. Daily, biweekly, and weekly tasks
  2. Nonscheduled time to be used at principal's discretion
  3. Tasks to be perfomed when the principal has made no assignments utilizing nonscheduled time
- Schedule all work during school vacations.
- Train and supervise all custodial personnel.
- Evaluate custodians after consultation with the principal.
- Hire custodians, with principal acting in an advisory capacity, if the principal desires.
- Reassign custodial personnel after consultation with the principals involved.
- Review custodial schedule with principals to clarify procedures, identify problems, and inspect plant.
- Use suggestions and experience of custodians and principals to improve the custodial program.

It is the responsibility of the principal to:

- Evaluate the cleanliness of the school and notify the supervisor of maintenance and operations of any concerns.
- Consult with the supervisor of maintenance and operations regarding evaluation of personnel as it relates to conduct with other school personnel and students, cooperation, and work habits.
- Act as a consultant to the supervisor of maintenance and operations in the selection of custodians for his or her school.
- Refrain from working custodians out of job classification (particularly in the supervision of students).
- Inform staff of custodial problems and costs and offer suggestions to teachers as to how they and their students may assist in making the custodial program less costly and more efficient.
- Respect the custodian as an important member of the school staff.

It is the responsibility of the custodian to:

- Carry out work responsibilities.
- Notify the principal of any hazardous condition which exists.
- Offer suggestions to the supervisor of maintenance and operations for program improvement.
- Complete all work required by principal or other staff members.
- Transmit work-related concerns to the supervisor of maintenance and operations, who will resolve the problems in consultation with principal or staff members.
- Use unscheduled time in productive labor.
- Make a daily maintenance inspection of the buildings and grounds. When maintenance problems are found, correct them as appropriate. Notify the maintenance department by phone in emergency situations and in writing for routine items.

It is the responsibility of the teacher to:

- Assist and cooperate with custodians in the interest of maximum custodial efficiency and building cleanliness.
- Channel unusual requests for service through the principal's office.
- Discuss routine matters and problems directly with the custodians involved.
- Respect custodians as an important part of the school.

Custodial Staffing

Custodial staffing depends on many factors. Some factors to be considered are (1) the standards of sanitation, comfort, and appearance established by the governing board and administration; (2) the organization of the operations department; and (3) the work load and performance standards appropriate for each district.

Normally, the governing board and the administration will establish very high standards of cleanliness, sanitation, comfort, and appearance for school classrooms and other facility spaces. To adhere to these high standards, the operations organization should be well planned and should encompass modern business management practices. Line and staff relationships and personnel management factors, such as span of control and the delegation of authority, are important considerations. Other business management decisions should be geared toward attaining a high degree of productive performance and services responsive to the needs of the educational program. An important method of determining custodial staffing requirements is using established work load formulas to assist management in determining the number and work locations of personnel required.

Custodial Work Load Formulas

The number of custodians needed to staff schools depends on several factors. Salaries are the major item of expense in the operational cost of a school facility. The number of custodians must be sufficient to do the job, and they must be assigned enough work to keep them busy during work hours. If school facilities are to be kept in a habitable condition, the work load must be distributed equitably among each member of the custodial staff.

One of the earliest units of measuring custodial work load was the square footage of floor area to be cared for. In the computation of work loads based on the amount of square feet of floor area, several variables must be considered. The age and condition of the floor are important factors. The time needed to sweep a floor may be as much as 20 percent longer if the floor is in poor condition. Less time is required to sweep resilient tile than to sweep a rough concrete floor. The extent to which a school is used and the types of activities for which it is used are also important variables. School facilities may contain special rooms; multipurpose rooms and auditoriums; and classrooms with sinks, movable furniture, and large portions of glass. Factors other than area of floor space should be considered whenever the custodial work load is measured.

Many custodial duties vary widely from day to day. As a result, custodians should keep a flexible work schedule so that all the expected and unexpected demands on their time can be met with reasonable efficiency. Relatively simple methods of measurement are inadequate for determining a custodian's work load. Such items as the number of classrooms and open-space classrooms, the number and location of the plumbing fixtures, and heavily or sparsely furnished rooms affect the total work load. Community recreational uses of school buildings may increase the custodial work load.

Many formulas exist to determine the custodial needs of individual schools. The formulas have been refined by comparing them with actual practice. This comparison sometimes results in changing some of the factors used in the formulas; but on many occasions the revisions have resulted in reducing the number of employees assigned to an individual school.

Of the many excellent formulas now in use, only four are presented here: the CASBO work load formula; the San Joaquin task-time frequency formula; the Denver custodial formula; and the area allotment per person-hour formula. All four have a high degree of reliability and can be used safely, with discretion, by managers planning the custodial staffing for a new school facility. The formula developed by a committee of the California Association of School Business Officials (CASBO) and the formula developed by the Denver public schools are also used by many school districts in making periodic checks on the staffing patterns of custodial employees. Such formulas have been proved satisfactory in measuring work loads.

CASBO Work Load Formula

The CASBO work load formula was developed in the eastern part of the United States and adapted for use in California in 1958. The formula was designed to calculate the number of custodians needed for an individual school facility. Tested in many California school districts, the formula has a high degree of validity as an indicator of work load requirements.

In 1976 the Southern Section Maintenance and Operations Research and Development Committee of CASBO completed a survey to study the validity of the CASBO formula and its use in California school districts. A majority of school districts participating in the survey reported information that validated the usefulness of the CASBO formula in developing prudent custodial staffing allowances.

The committee observations taken from the survey reports are presented in outline summary:

1. There is a significant correlation between actual existing custodial staffing and that prescribed by the CASBO formula.
2. The CASBO formula appears valid for large and small school districts.
3. CASBO formula staffing can provide the capability of maintaining 90 percent or even 100 percent of desired standards of cleanliness.
4. A financial budget based on the CASBO formula appears to provide adequate funds for custodial personnel.
5. The CASBO formula appears overall to be a reasonably valid approach to estimating custodial work load and staffing requirements.
6. There is no single magical formula. Although the CASBO formula can be used both for estimating budgets and work load requirements, other more definitive analytical methods, such as time and work standards for tasks required in consideration of the variables at each location, will provide a more refined definition (validation, corroboration, and so forth) of actual custodial staffing requirements.

This formula does not consider the amount of custodial time required to do other than cleaning and routine maintenance duties. The time taken to answer the principal's requests for delivering supplies, moving equipment, or doing odd jobs for teachers, as well as the time needed for doing any gardening work, varies from school to school and should be added to the factors developed by the formula. Appendix B, "Time Schedules," contains directions for using the CASBO formula.

San Joaquin Task-Time Frequency Formula

The San Joaquin task-time frequency formula is an example of a custodial work load formula that is performance-engineered on a task-time frequency basis. It was originally developed by the Westinghouse Learning Corporation for the San Joaquin Elementary School District, which was later incorporated into the Irvine Unified School District.

The formula includes (1) the identification of each custodial elemental task involved; (2) the assignment of a reasonable performance time interval under local conditions for each task; and (3) the determination of the frequency of the task performance necessary to maintain the standards of performance established by policy. Combining these factors results in a performance engineered work load determination of custodial staffing requirements. (Appendix B, "Time Schedules," includes directions for using this formula.)

This formula was developed by first determining the custodial task and by calculating the time it takes to perform each task. These figures are referred to as the custodial elemental standard times. The second step was to determine custodial benchmark standards for each component (classroom, washroom, and so forth). This was done by multiplying task area or quantity by the unit time standard to obtain a custodial benchmark standard (task x time x frequency) for each component. The third step was to tabulate the custodial benchmark standards for all components of the school and the school operation to determine the total productive time required to clean the school. The tabulations in Appendix B are shown for an elementary school and for a middle school. For the total productive hours to be determined, the daily allowance for personal time must be included.

Denver Custodial Formula

The Denver custodial formula was developed by the administrative staff of the Denver, Colorado, public schools after a study had been made to determine the amount of time custodians need to perform their duties efficiently. All the elements of a custodian's job were analyzed to determine those elements performed during an average day. Ten major work categories (or elements) were isolated. Each of the ten elements was weighted according to the time required to perform the tasks. Although custodians perform tasks other than those included in the ten classifications, experience has shown that these classifications represent a valid measurement of work load. With one exception, variable factors such as pupil enrollment are not used. (However, community use of buildings was included in the list because community use of buildings affects the custodians' jobs.)

The ten basic elements contained in the Denver point system follow:

School site
Building units such as classrooms, offices, health services, library
Kindergartens
Lunchrooms and multipurpose rooms
Auditoriums
Heating plant
Plumbing fixtures
Gymnasiums
Community use of buildings
Building area

Next considered in the Denver formula is a method of weighting to keep the relationship of the various factors in balance. The time required to complete the various tasks involved is the basis for assigning points; one point is allotted for each 15 minutes of time spent. Appendix B, "Time Schedules," contains directions for allocating points according to the Denver formula.

Area Allotment per Person-Hour Formula

Some of the larger school districts in California estimate custodial needs according to the area allotment per person-hour formula. This formula is detailed and comprehensive and requires the business office to estimate the number of custodians required by computing the area of the buildings and grounds contained in the various categories (such as permanent buildings, portables, locker and shower rooms, sidewalks, and lawns) and then to compute the area allotment per person-hour. In most instances the different jobs to be performed are timed on the basis of number of square feet to be covered by each person. Appendix B, "Time Schedules," contains directions for using this formula.

Characteristics of an Effective Custodian

The work of the school custodian is complicated by the many varied duties and the necessary interaction with students and school staff. Because most custodians interact daily with students, any individual selected for the position should be of good character. He or she should also be able to interact appropriately with students and to set a good example in the manner in which job duties are performed. A fingerprint check of all applicants is required by the *Education Code*.

The custodian should be willing to work irregular hours, including working a split shift or starting work in the afternoon after school. Most school managers find that custodians work more effectively after the building has been cleared of other staff members. In a split shift, which is sometimes necessary in small districts, the custodian reports to work in the morning, takes a break of several hours in the middle of the day, and finishes the workday in the late afternoon.

Because of the varied nature of the work, a custodian should possess some mechanical aptitude and skills. In some large districts the custodian completes minor repairs. In some small districts the custodian makes all necessary repairs to equipment and must often do the grounds work. In addition to jobs requiring mechanical aptitude, the custodian will usually be required to perform a certain amount of climbing and lifting. As a result, good health is essential. Most districts require custodial applicants to pass a physical examination and be free of any physical condition that would hinder him or her in performing custodial duties or that might endanger the safety of others.

A custodian should be neat and clean in appearance and be willing to wear the type of clothing that allows him or her to perform the work required by the position. Frequently, the custodian is the first person a visitor meets on coming into a school building and presents the visitor one of the first impressions of the school.

Custodial Services for Students and Staff

The primary role of the custodian is to provide custodial services as assigned. These services do not include the supervision or discipline of students. The care and discipline of students is the responsibility of the educational staff. The custodian should never, therefore, assume or accept responsibility for disciplining any student. To do so would be a violation of the custodial responsibility and would imply neglect by the educational staff. A good custodian knows, however, that the goodwill of the students makes the job easier and more pleasant. If the custodian does not establish a favorable relationship with the students, his or her work will be made more difficult; and the building will show evidence of this lack of cooperation.

Experienced custodians attempt to treat each staff member according to his or her individual needs. Because the custodian is generally available, principals, teachers, and other school staff members may impose on the custodian by making numerous special requests. Both the students and the school benefit when the school staff members and the custodian have a mutual respect for each other's responsibilities and adhere to the administrative patterns that have been established. A cooperative, mature attitude on the part of school staff members will have a significant positive impact on the custodian's ability to contribute to the overall educational process.

The Custodial Schedule

In a small school building with only one custodian, work hours should be adjusted to local needs. Legislation has established a 40-hour work week for all classified employees of school districts in California. Consequently, the custodian may be expected to work a broken shift or split shift in a small school. The custodian should arrive early in the morning to check on the operation of the heating and air-conditioning system, see that utilities are in operation, check for vandalism or safety problems, open the buildings and rooms, and put up the flag. After the students and staff have departed for the day, the custodian should do the sweeping and cleaning necessary to put the building in order for the next schoolday and then lock the building. While school is in session, the custodian can do minor maintenance. Some experimentation and changes may be necessary until a schedule that fits the local situation is worked out.

When more than two custodians are assigned to a school facility, one should be designated as head, lead, senior, or supervisory custodian. The principal should direct all information and questions regarding operations at an individual school to the supervisory custodian. In addition, all work assignments should be channeled through the supervisory custodian. All teachers' requests for services or teachers' complaints regarding the condition of the school should be directed first to the principal. Requests from teachers should not be made directly to the custodian.

The supervisory custodian usually reports for work early in the morning and works a straight day shift. This shift allows the supervisory custodian to check in supplies, answer the principal's requests for work to be performed by the custodial staff, and check on the overall cleanliness of the building. The supervisory custodian performs many of the nonscheduled tasks that are necessary for the smooth operation of the school. The end of the supervisor's shift usually overlaps with the beginning of shifts worked by other custodians. During the overlap period the supervisor should make assignments, discuss the cleaning of the building with those on duty, and perform other supervisory functions.

Many school districts have given the supervisory custodian of larger schools a late-shift assignment so that the cleaning operation can be closely supervised. If a supervisory custodian does extra night work, made necessary by community use of the building, it is sound practice to pay overtime for this work through the regular district payroll. Custodians paid in this manner are fully covered by the district's insurance program. If they are paid for extra duty by organizations in the community, there may be a question of responsibility if the custodian is injured while on the job. When the building is used at night, one custodian should always be scheduled for work during those hours so that the building can be secured at the end of the evening. Any custodial overtime must be authorized by the appropriate manager.

The custodial schedule should reflect an orderly working program but should not be so rigid that special situations cannot be met. The schedule should be written out in detail because much effort can be wasted unless the custodian's time is organized. Each custodian should have a daily written work schedule. A schedule has a number of attendant values. The schedule indicates a reasonable day's work and can be used to identify where the custodian is working at any given time. It can also be used as an inspection checklist and is valuable as an instruction sheet for a substitute custodian. In addition, a schedule aids in the orientation and staff development of new personnel.

Preparing a written work schedule is not difficult. In fact, most custodians use some type of written time plan. The manager and the business office should follow a cooperative program of scheduling. Moreover, the schedule should be revised as needed to improve the methods used, to compensate for personnel changes, and to reflect the use of improved equipment.

The first step in developing a schedule involves listing the custodial tasks and estimating the time required to perform each task.

If the employee is assigned to a school where more than one person is responsible for caring for the school facility, the schedule should be developed cooperatively with the building principal and supervising custodian. Schools differ not only in size, construction materials, floor plan, number of students, and kinds of equipment used but also in educational programs. Accordingly, the work schedules at the various schools will differ.

Two examples of daily and weekly work schedules for a custodian in a large school follow. One example is for an early shift and the other for a late shift.

Schedule of Daily Operations—Early Shift

		Minutes
6:30 a.m.	Check for vandalism and safety problems, including heating and air-conditioning systems.	15
6:45 a.m.	Sweep, vacuum rug, and dust principal's and secretaries' offices; clean toilet, basin, mirror; fill dispensers; empty wastebaskets.	20
7:05 a.m.	Sweep and dust nurse's room; clean sink, drainboard, toilet, basin, and mirror; fill dispensers; empty wastebaskets.	20
7:25 a.m.	Sweep, vacuum rug, and dust teachers' restroom; clean sink, toilet, basin, and mirror; fill dispensers; empty wastebaskets.	25
7:50 a.m.	Open buildings and gates; put up flags.	15
8:05 a.m.	Sweep all entries to buildings, walks to street, and sidewalks.	40
8:45 a.m.	Sweep and dust; empty wastebaskets; spot clean glass, walls, woodwork, and floors as necessary.	25
9:10 a.m.	Do weekly work; see schedule of weekly operations.	100
10:50 a.m.	Reserve time for special requests or sweep corridors as necessary.	45
11:35 a.m.	Perform necessary cleanup following dismissal of pupils.	20
11:55 a.m.	Lunch	60
12:55 p.m.	Sweep lunch shelter area; clean under tables and sweep walk to street; wipe up spillage on lunch tables; pick up papers on grounds and empty wastebaskets; wash wastebaskets daily.	60
1:55 p.m.	Check and tidy up the boys' and girls' restrooms.	10
2:05 p.m.	Sweep multipurpose building.	15
2:20 p.m.	Sweep and dust teachers' workroom.	10
2:30 p.m.	Perform miscellaneous custodial work or minor maintenance repairs.	60
3:30 p.m.	End of shift	

Schedule of Daily Operations—Late Shift

		Minutes
2:00 p.m.	Clean sinks and drainboards and fill dispensers in rooms 1, 2, 3, and 5.	20
2:20 p.m.	Room 1—sweep, clean chalk rails, empty wastebaskets.	15
2:35 p.m.	Room 2—sweep, clean chalk rails, empty wastebaskets.	13
2:48 p.m.	Room 3—sweep, clean chalk rails, empty wastebaskets.	13
3:01 p.m.	Room 5—sweep, clean chalk rails, empty wastebaskets.	13
3:14 p.m.	Clean sinks and drainboards and fill dispensers in rooms 4, 6, 7, 8, 10, 11, and 12.	40
3:54 p.m.	Room 4—sweep, clean chalk rails, empty wastebaskets.	13
4:07 p.m.	Room 6—sweep, clean chalk rails, empty wastebaskets.	13
4:20 p.m.	Room 7—sweep, clean chalk rails, empty wastebaskets.	13
4:33 p.m.	Room 8—sweep, clean chalk rails, empty wastebaskets.	13
4:47 p.m.	Room 9—sweep, clean chalk rails, empty wastebaskets.	14
5:01 p.m.	Room 10—sweep, clean chalk rails, empty wastebaskets.	14
5:15 p.m.	Room 11—sweep, clean chalk rails, empty wastebaskets.	14
5:29 p.m.	Room 12—sweep, clean chalk rails, empty wastebaskets.	14
5:43 p.m.	Weekly work for cleaning chalkboards; see schedule of weekly operations.	12
5:55 p.m.	Lunch	30
6:25 p.m.	Sweep and dust girls' toilet room. Clean toilets, wash sinks and mirrors, fill dispensers, clean walls and partitions if necessary, and empty wastebaskets. Mop toilet floors daily.	75
7:40 p.m.	Sweep inside corridors, steps, and landings of all sections.	25
8:05 p.m.	Dust rooms 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, and 12.	60

9:05 p.m.	Do weekly work; see schedule of weekly operations.	40
9:45 p.m.	Use this time for miscellaneous custodial work as directed by supervisory custodian, such as mopping and buffing main building corridors as necessary.	45
10:30 p.m.	End of shift	

Schedule of Weekly Operations

Monday

10:15 a.m.	Sweep remainder of walks.
5:43 p.m.	Clean chalkboards in rooms 1 and 2.
9:05 p.m.	Clean glass, woodwork, walls, and floors in rooms 1, 2, 3, and 4.

Tuesday

9:25 a.m.	Sweep walks.
5:43 p.m.	Clean chalkboards in rooms 3 and 4.
9:05 p.m.	Clean glass, woodwork, walls, and floors in rooms 5, 6, 7, and 8.

Wednesday

5:43 p.m.	Clean chalkboards in rooms 5 and 6.
9:05 p.m.	Clean glass, woodwork, walls, and floors in rooms 9, 10, 11, and 12.

Thursday

5:43 p.m.	Clean chalkboards in rooms 7, 8, and 9.
9:05 p.m.	Service custodial equipment every two weeks as necessary.

Friday

5:43 p.m.	Clean chalkboards in rooms 10, 11, and 12.
9:05 p.m.	Mop floors in principal's, teachers', and nurse's toilet rooms.
9:25 p.m.	Clean glass, woodwork, walls, and floors in principal's and teachers' restrooms, nurse's room, and conference room.

Grounds Operations

The goal of grounds maintenance service is to economically provide clean, neat, safe, and functional grounds in support of the educational program of the school district. School and civic pride are enhanced by appropriate grounds maintenance procedures applied to school facilities. Attractive grounds generally enhance pupils' appreciation of and respect for school property. The significant benefits of well-maintained, attractive school grounds justify the time and effort necessary to establish board of education policies that contribute to the development of specific departmental goals and objectives.

Some of the normal tasks associated with grounds can include picking up and removing litter; cleaning surfaced play areas; watering; cleaning catch basins and covers; and sweeping or cleaning roadways, walkways, breezeways, and driveways. In addition, attention should be given to tennis courts, athletic fields, and grass play areas. Many of these tasks are regularly performed by custodians and should be incorporated in their daily schedules.

The right supplies and equipment for each job must be obtained to accomplish necessary grounds tasks. Proper storage facilities to house these supplies and equipment should also be provided.

Goals and Objectives

The following checklist may be used as a guide in establishing and developing grounds maintenance goals and objectives. Generally, these goals and objectives seek to:

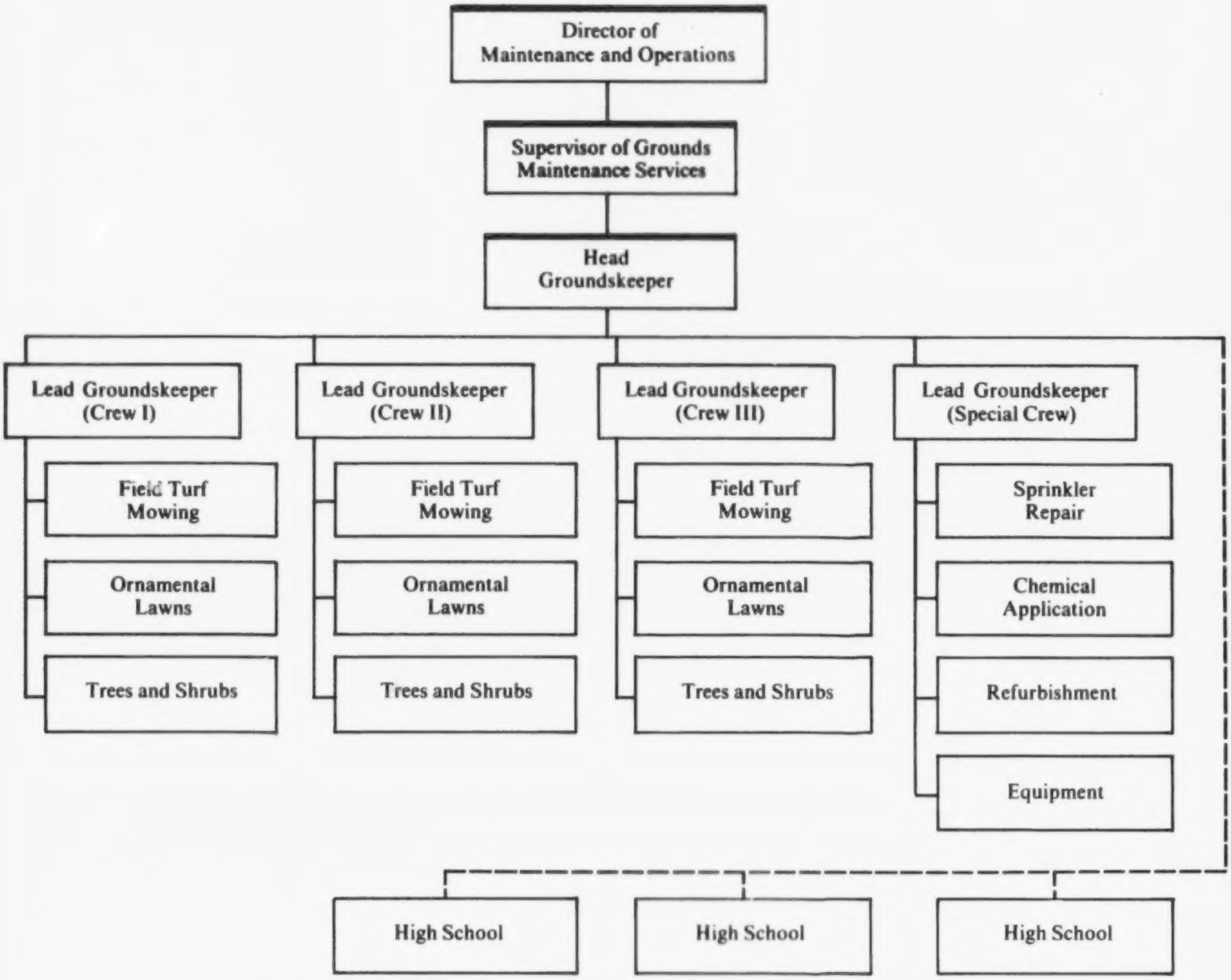
- Conceive, develop, and operate an effective grounds maintenance organization.
- Accomplish economy of operations.
- Recruit and train highly proficient personnel.
- Develop and implement effective, functional, and safe procedures and methods.
- Select and use the most effective and economical supplies and equipment.
- Work with the district administration in support of a superior educational program.

Administrative Lines of Authority

As in other operations functions, the lines of authority and responsibility for grounds maintenance operations vary among school districts. The geographical size of the district, the number of sites, the acreage and complexity of ground facilities, and the geographical distribution of sites are some of the factors that determine the nature of the administrative lines of authority and responsibility.

In small districts the responsibility for grounds maintenance services may be combined with other operations functions and assigned to one manager, usually the superintendent, business administrator, or another district official. In very large school districts, the responsibility for grounds maintenance services may involve several levels of managers and a division of lines of authority along specialized technical fields.

In medium-sized school districts, the responsibility for grounds maintenance services may be assigned to the director of maintenance and operations and to a supervisor of grounds maintenance services. Figure 18 illustrates the lines of authority and responsibility assigned in a medium-sized district having approximately 16,000 average daily attendance. The district is responsible for the grounds maintenance at 25 school sites and five administration facilities. The school sites vary in size from eight to 40 acres and are fully landscaped with turf fields, ornamental plantings, ground cover, flower beds, and landscaped banks.


Director of Maintenance and Operations
Supervisor of Grounds Maintenance Services
Head Groundskeeper
Lead Groundskeeper (Crew I)
Lead Groundskeeper (Crew II)
Lead Groundskeeper (Crew III)
Lead Groundskeeper (Special Crew)
Field Turf Mowing
Ornamental Lawns
Trees and Shrubs
Field Turf Mowing
Ornamental Lawns
Trees and Shrubs
Field Turf Mowing
Ornamental Lawns
Trees and Shrubs
Sprinkler Repair
Chemical Application
Refurbishment
Equipment
High School
High School
High School

---- Groundskeepers located permanently at high school sites technically are supervised by the district supervisor of grounds maintenance services

Fig. 18. Responsibilities for maintenance and operations in a medium-sized school district

Each elementary school and middle school has a significant number of asphalt playgrounds, including equipment. Each high school has athletic fields and two football stadiums. The supervisor and head groundskeeper have line authority over three five-person groundskeeping crews; each crew has complete groundskeeping responsibility for ten sites. At each site these regular groundskeeping crews perform the gardening tasks necessary to maintain all landscaping and playgrounds at the site and all tasks necessary to maintain a clean and neat campus. In addition to the three regular groundskeeping crews maintaining 30 sites, two-person special crews repair sprinkler and irrigation systems, apply chemicals, and repair and maintain equipment. The supervisor and head groundskeeper are assigned technical management responsibility for the groundskeepers who may be permanently located at the high schools.

Job responsibilities in such an administrative organization may be outlined as follows:

1. *Director of maintenance and operations.* Is responsible for building maintenance, custodial maintenance services, and grounds maintenance.
2. *Supervisor of grounds maintenance services.* Is responsible for and manages the grounds maintenance operations (i.e., plans, organizes, schedules, supervises, and inspects).
3. *Head groundskeeper (district).* Serves as assistant to the supervisor and as a working leader who assumes responsibilities for the groundskeepers working in the field to ensure the crews are accomplishing the proper work tasks in a timely, efficient, and cost-effective manner. When a new employee is hired, the head groundskeeper provides training in safety procedures and work methods.
4. *Lead groundskeepers.* Are leaders and managers of the crews and have charge of the mowing and cleaning. They are responsible for all grounds maintenance at each site and must provide additional training and see that all safety measures are enforced.
5. *Grounds crews.* Are composed of groundskeepers trained in maintaining all landscaping. They mow and edge the lawn, weed the flower beds, and rake all papers, leaves, and debris in and around the sites. Grounds crews work on a weekly schedule that covers a designated number of sites.
6. *Sprinkler repair crews.* Replace, repair, and maintain all of the district's grounds irrigation systems. In addition, they check all back-flow devices once a year and on occasion install new systems. They are responsible for setting times on the sprinkler clocks so that proper water distribution occurs.
7. *Chemical application groundskeepers.* Apply all herbicides, insecticides, and growth retardant chemicals throughout the district. Environmental regulations and toxicity of chemicals used require compliance with rigid safety standards. Most chemical application groundskeepers must have a valid applicable state license.
8. *Field turf mowing groundskeepers.* Mow all large turf areas and perform all maintenance tasks as assigned.
9. *Refurbishment crew groundskeepers.* Perform a variety of grounds maintenance refurbishment tasks. These tasks include the major repair of grounds; the replacement of turf, shrubs, trees, and other plant material; and the design and installation of landscaping and irrigation of a special nature.
10. *Grounds equipment maintenance persons.* Service all grounds maintenance equipment; inventory and place equipment on a preventive maintenance schedule.
11. *Site groundskeepers.* Are assigned to the district high schools and middle schools to perform grounds maintenance at sites. Similar to custodians, they work functionally for the site administrator and technically for the supervisor of grounds maintenance services.

Figure 19 illustrates the lines of authority and responsibility in a high school district encompassing eight high schools.

The function of the grounds branch is to maintain the district's landscaped and turfed areas and the irrigation sprinkler systems. If time allows, the grounds branch also assists in the construction, modification, and alteration of sprinkler systems; installs semipermanent lining on athletic fields; and provides assistance in controlling rodents and repairing drainage systems.

Staffing and Work Load Formulas

The personnel staffing of grounds maintenance is similar to other operations functions and influenced by many variable factors. Educational managers generally recognize the value of maintaining well-landscaped and functionally designed grounds that enhance and support the educational program. Many school districts, particularly those in suburban areas, are extensively landscaped, usually in conformance with the standards of the community. In urban areas the design and layout of school grounds play an important part in the facility's environment.

Properly maintained grounds require an appropriate number of technically qualified personnel. The determination of the required number of personnel is a highly variable consideration. However, gardening and grounds maintenance is a highly technical science that to be successful must be performed by highly

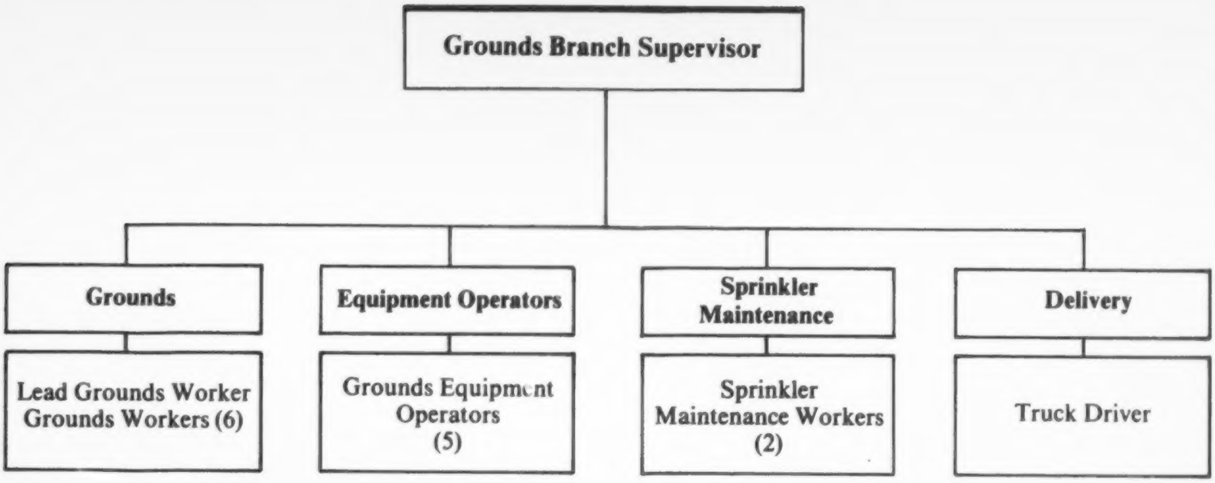


Fig. 19. Grounds branch functional organization

knowledgeable and experienced people. The hundreds of tasks performed by a gardener are complicated. The diverse and detailed nature of the work makes it difficult to establish work load formulas.

For this reason few scientific studies have been made of work load standards or formulas. However, some useful studies have been done, including "Report to the Board of Education on the Study of Gardening Operations" (San Diego City Unified School District, Business Services Division); *Labor Requirements Analysis for Landscape Maintenance—Leaflet 21232* (University of California, Division of Agricultural Sciences); and *Custodial and Gardening Standards in the Los Angeles City School District* (Louis J. Kroeger and Associates, Los Angeles).

The method of analyses, factors considered, information gathered, and conclusions presented are pertinent to current groundskeeping and gardening practices in California school districts. The data resulting from these studies can be used as a point of reference in making studies of current staffing requirements for grounds maintenance functions.

Figure 20 indicates a method used in several school districts to compute the costs of grounds maintenance operations.

Relations with Students, Staff, and Community

All grounds staff members must conduct themselves in a friendly, courteous manner. They should respect their fellow employees and provide assistance to community members and visitors to the school. It is a good policy to require all grounds staff members to wear uniforms that contribute to a neat, well-groomed personal appearance. All new grounds staff members should receive an orientation that includes a discussion of safe work methods and proper operation of equipment. As new types of equipment are purchased, staff members should receive training in safe operation and handling procedures. Grounds staff members must be conscious at all times of student safety. Since students are generally attracted to machinery and equipment, the grounds staff members should take special care to avoid accidents and injury to students. In addition, the conduct of grounds staff members should set a good example for students.

Facilities, Equipment, and Supplies

The right supplies and equipment for each job must be obtained to accomplish necessary grounds tasks. Proper storage facilities to house these supplies and equipment should also be provided. Although a comprehensive grounds program is costly, the district should give the grounds operation the same consideration in the budgeting process as given other departments. In this way, school grounds can be maintained in a standard compatible with the surrounding community.

Staff Requirements

Facility: ______________________

Size ____ Acres = ______________ square feet

Turf area ______________ square feet

Parking area ______________ square feet

Sidewalks ______________ square feet

Number of trees ______________

Number of shrubs ______________

Number of sprinkler heads ________

Building size ______________ square feet

Labor Estimate

Function	*Area*	x	*Frequency*	x	*Standard*	=	*Staff member hours*
1. Mowing							
Tractor, 7 gang ______	square feet	x	______________	x	0.033/5,000 square feet	=	______________
Mower, 42 inch ______	square feet	x	______________	x	0.050/1,000 square feet	=	______________
Mower, 32 inch ______	square feet	x	______________	x	0.060/1,000 square feet	=	______________
Mower, 21 inch ______	square feet	x	______________	x	0.110/1,000 square feet	=	______________
Other	______________	x	______________	x	______________	=	______________
					Subtotal		______________
2. Fertilization							
Lawns, whirlwind ______	acres	x	______________	x	0.270/acre	=	______________
Shrubs ______	square feet	x	______________	x	0.068/1,000 square feet	=	______________
					Subtotal		______________
3. Aeration							
Tractor ______	square feet	x	______________	x	0.270/1,000 square feet	=	______________
Hand ______	square feet	x	______________	x	0.50/1,000 square feet	=	______________
					Subtotal		______________
4. Edging							
Tractor ______	linear feet	x	______________	x	0.127/1,000 linear feet	=	______________
Hand ______	linear feet	x	______________	x	1.01/1,000 linear feet	=	______________
					Subtotal		______________

Fig. 20. Grounds maintenance cost analysis procedures

Labor Estimate

Function	*Area*	*x*	*Frequency*	*x*	*Standard*	=	*Staff member hours*
5. Detaching							
Tractor ____	square feet	x	____	x	0.028/1,000 square feet	=	____
16-inch machine ____	square feet	x	____	x	0.088/1,000 square feet	=	____
					Subtotal		____
6. Sprinkler Repair							
____	Heads	x	____	x	0.020	=	____
					Subtotal		____
7. Pruning							
Trees ____	Trees	x	____	x	0.25/tree	=	____
Shrubs ____	Shrubs	x	____	x	0.12/shrub	=	____
					Subtotal		____
8. Policing							
____	Acres	x	____	x	0.22/acre	=	____
					Subtotal		____
9. Insect Control							
Trees ____	Trees	x	____	x	0.08/tree	=	____
Shrubs ____	Shrubs	x	____	x	0.05/shrub	=	____
					Subtotal		____
10. Weed Control							
Tractor, 5-foot cut ____	square feet	x	____	x	0.100/5,000 square feet	=	____
Scuffle hoe ____	square feet	x	____	x	0.2/1,000 square feet	=	____
Hand weeder ____	square feet	x	____	x	0.4/1,000 square feet	=	____
Spraying (hand) ____	square feet	x	____	x	0.042/100 square feet	=	____
Turf spraying (tractor) ____	square feet	x	____	x	0.060/10,000 square feet	=	____
					Subtotal		____
11. Washing Paved Areas							
Tennis courts ____	courts	x	____	x	0.5/court	=	____
Sidewalks ____	square feet	x	____	x	0.111/1,000 square feet	=	____
					Subtotal		____

Fig. 20. Grounds maintenance cost analysis procedures (continued)

Labor Estimate

Function	*Area*	*x*	*Frequency*	*x*	*Standard*	=	*Staff member hours*
12. Raking Sand Areas							
Sand rake ________	square feet	x	________	x	1.10/1,000 square feet	=	________
					Subtotal		________
13. Cultivation							
Hand ________	square feet	x	________	x	0.868/1,000 square feet	=	________
					Subtotal		________
14. Seeding—Overseeding							
Scooter, whirlwind ________	acres	x	________	x	1.270/acre	=	________
					Subtotal		________
15. Removing Leaves							
Rake, hand ________	square feet	x	________	x	0.340/1,000 square feet	=	________
Vacuum-master ________	square feet	x	________	x	0.090/1,000 square feet	=	________
Turf vacuum ________	square feet	x	________	x	0.02/1,000 square feet	=	________
					Subtotal		________
16. Travel Time							
A. Mowing ________		x	________		0.5 staff member hours	=	________
B. Fertilization ________		x	________		0.5 staff member hours	=	________
C. Aeration ________		x	________		0.5 staff member hours	=	________
D. Detaching ________		x	________		0.5 staff member hours	=	________
E. Tree work ________		x	________		0.25 staff member hours	=	________
F. Policing ________		x	________		0.25 staff member hours	=	________
					Subtotal		________
					Staff member hours total		________

Total labor = ________ staff member hours = ________ percent of one staff member hour

(.2020 staff member hours = 1 staff member year)

Fig. 20. Grounds maintenance cost analysis procedures (continued)

Fringe Benefits

1. Rest periods

_______ Staff member hours/day x _______ days x _______ percent = _______________

2. Vacation

_______ days/employee at 8 hours/day x _______ percent = _______________

3. Sick leave

_______ days/employee at 8 hours/day x _______ percent = _______________

4. Holidays

_______ days/years at 8 hours/day x _______ percent = _______________

5. Miscellaneous fringe benefits

= _______________

Total fringe benefits _______________

Total labor _______________

Total staff member hours _______________

$____ per hour x _______ staff member hours = $_______________

Administration costs

_______ percent x $ _______________ = $_______________

Grand total _______________

Fig. 20. Grounds maintenance cost analysis procedures (concluded)

Chapter 5

Managing Other School District Responsibilities

This chapter contains a discussion of some of the other responsibilities commonly entrusted to the director of maintenance and operations:

- Proper use of school facilities
- Management and conservation of energy
- Control of hazardous materials
- Control of pests
- School safety and security
- Access for the handicapped

Proper Use of School Facilities

California law permits the school district governing board to grant the use of school buildings or grounds for public, literary, scientific, recreational, or educational meetings or for the discussion of matters of general or public interest. The board may also establish such terms and conditions of use as it deems proper, subject to the limitations, requirements, and restrictions set forth in the *Education Code*.

School facilities are used increasingly for recreation, citizenship training, and leisure time activities. The schools are more frequently being used as centers where both children and adults may learn and community groups may meet to serve common needs. The policy of the district should provide for maximum use of school facilities to provide the greatest service to the community. It is important that guidelines be formulated to implement adopted policies relating to the use of school facilities under the Civic Center Act (*Education Code* sections 40040—40047).

General Guidelines

When considering a request from an outside group to use school facilities, the school district governing board should determine (1) whether a proposed activity or meeting is one within the purview of the Civic Center Act; (2) whether a group requesting use of school facilities is organized for general character building or welfare purposes; (3) whether the applicant will charge admission, collect money, or solicit dues; and (4) whether city ordinances relating to business and charitable solicitations have been met.

All groups qualifying under the provision of the Civic Center Act may use school facilities for nonschool purposes. They must adhere to the rules and regulations as set forth by the governing board. In general, the subject matter of such meetings must pertain to the recreational, educational, scientific, literary, economic, political, artistic, or moral interests of the community or to matters of general public interest. School facilities must not be used for subversive, immoral, offensive, or harmful purposes or for denominational or sectarian activities. In addition, the use of school facilities must not be granted to persons, forums, corporations, groups, clubs, or associations that (1) may, by such use, be reasonably expected to expose the property of the district to damage through riot, mob action, or violence of any kind; (2) would use the property in a manner adverse to the best interests of the school district; or (3) desire the use of facilities for a purpose not consistent with the Civic Center Act or adopted board policies.

Under no circumstances may an individual or a group be permitted to use school facilities for private gain through activities not recognized as recreational, educational, political, economic, artistic, or moral.

All groups qualifying under provisions of the Civic Center Act are required to comply with applicable city ordinances relating to business and charitable solicitations.

Important Terms

Persons responsible for giving permission to use school facilities should know the meaning of certain key terms:

Charitable purposes. As used in the Civic Center Act, a *charity* is generally defined as an organization or institution engaged in gratuitous acts or works of benevolence to the needy. Charities include the following:

1. Those organizations that exist solely for the purpose of gratuitously alleviating public distress, such as the American Red Cross
2. Those organizations or groups that raise funds to give relief to specific classes or groups that under specific conditions are unable to help themselves, such as the victims of a community fire
3. Service clubs or other organizations that raise funds to commemorate historical events
4. Groups that raise funds for the restoration of historical landmarks or buildings

Character building. As used in the Civic Center Act, *character building* is the act of instilling acceptable qualities of morality in an individual, such as truth, honesty, moral vigor, kindness, and mental and physical courage. Mental and physical self-discipline has always been considered desirable, and an organization formed to promote and build these concepts into the character of an individual, particularly a minor person, would properly be defined as a character-building organization. An organization such as the Boy Scouts would ideally fit the definition; however, it is not necessary for an organization to be formed along the lines of the Boy Scouts to qualify. Athletic organizations that exist to build discipline and concepts of honesty, fair play, and physical courage qualify as character-building organizations.

Welfare purposes. As used in the Civic Center Act, *welfare purposes* may be broadly defined as organized efforts directed toward the social betterment of a class or group. Ordinarily, welfare activities are directed toward the protection, care, and assistance of people in need and unable to provide for themselves.

Commercial rentals. Commercial rentals is a term that applies to those organizations or individuals that do not qualify under the Civic Center Act and charge admissions or fees for the activity. The governing board or the designated representative should determine whether the facility might be rented. The minimum rental should be equal to the regular market value charged for rental of comparable facilities.

Priority for Use

A suggested priority list for use in determining the use of school facilities is presented as follows:

1. Activities and programs directly related to the instructional and educational program(s) of the district
2. Those events or activities that are (a) designed to serve the youths and citizens of the individual school community that are planned and directed by school-related groups; and (b) connected with community recreational programs
3. Use by community organizations whose primary purpose is service to youths or the improvement of the general welfare of the community
4. Use by individuals or groups that are eligible to rent the facilities for legitimate purposes in accordance with the *Education Code* and whose net receipts are not expended for pupil welfare or charitable purposes

Requests for Use

Requests for the use of school facilities should be submitted in writing on a form approved by the board and signed by the person assuming responsibility for the organization's use of the facility. This application serves as the agreement for use of the school facility. The application is also the instrument that allows the school administration and the applicant to arrive at a complete and equitable understanding as to what their desires are regarding the use of school property.

The applicant should include all information pertinent to the planned activity and review the rules and regulations of the board of education regarding the use of school facilities. These rules and regulations should be attached to or appear on the application form.

If the application shows irregularities, the district administration may request that the governing board review the application. The board may notify the applicant of the time and place for the review and extend to the applicant an invitation to answer questions that may arise regarding the application.

Rental fees or service charges should be paid in advance of the activity. The buildings should be opened for use only upon proof of an approved request for the use of the school facility to the custodian in charge.

The operations department must authorize the necessary overtime for district personnel required for the activity. At least one custodian should be on site during the activity and should remain to make sure that the facility is in good order and is locked after the activity is completed.

Use of Athletic Facilities

In general, all school district playing fields should be free and open for community use except for special services requested of the district. Groups wanting exclusive use of the playing field, track, or other athletic area should submit a request indicating dates, times, and purpose of use.

Management and Conservation of Energy

In the past, energy sources were considered both inexhaustible and expendable. These assumptions were seemingly verified by the relatively low cost of most energy forms. The problems fostered by such attitudes are exemplified in many existing school buildings. Typically, school buildings were designed and constructed primarily with initial cost in mind. This policy resulted in the construction of many buildings that by today's standards use excessive amounts of energy.

During the past several years, districts have experienced dramatic increases in electric, gas, and water bills. This trend is largely due to significant rate increases rather than to the district's utility usage.

Energy costs have risen so sharply that, with the exception of salaries, utility bills are the largest continuing expense for a school district. In the face of these problems, energy utilization is more than simply a problem of passing costs on to the public. It is the district's responsibility to minimize the use of energy, thereby reducing the impact of energy costs on the public and conserving the supply of scarce energy resources such as oil and gas.

One energy conservation approach is called *total energy management*. In essence, total energy management considers every building as a unique, complex system. To conserve energy, it is first necessary to understand how the building consumes energy; how a user's needs are met; how the system's elements interrelate; and what effect is produced on the external environment. Through an understanding of how buildings consume energy, energy conservation improvements can be made that may be integrated into the system itself. Then, when the system is used, it runs efficiently and uses the least amount of energy.

Recommendations to Save Energy

It is wise to take advantage of the many sources of information from federal, state, and local government agencies when planning new facilities or improving energy consumption in existing facilities. In addition to the many resource materials available, the following energy conservation recommendations may be used as a guide for developing an awareness of sound energy practices. They can produce significant savings, and many can be implemented simply and quickly.

- *Heating*

Repair all leaks of water, steam, fuel, and so forth.

Lower indoor temperature and relative humidity.

Install a central supervisory control system to set back temperatures during unoccupied periods in noncritical areas and to regulate heating systems in general.

Recalibrate all controls.

Repair faulty equipment such as steam traps, valves, dampers, and so forth.

Turn off or eliminate all portable electric heaters when not needed.

Keep doors and windows closed when heating system is operating.

Repair cracks and openings in exterior surfaces.

Install and maintain insulation on all hot water pipes, fittings, and valves passing through areas that are not air-conditioned.

Insulate all duct work carrying conditioned air through areas that are not air-conditioned.

Reset heating water temperature in accordance with load.

Operate only necessary water pumps.

Reduce hours of fan and pump operation.

Check vents in hot water and steam systems for proper performance.

Keep unrestricted air movement in and out of radiators and convectors.

Balance water flows to minimally satisfactory levels.

Maintain all heating equipment at peak efficiency.

Use minimum number of boilers.

Clean combustion surfaces in accordance with manufacturer's maintenance procedures.

Seal all air leaks in combustion chamber.

Adjust fuel/air ratio.

Use proper water treatment to reduce fouling of heat transfer surfaces in boilers, heat exchangers, and so forth.

Isolate off-line boilers.

Substitute modular boilers for existing boilers that are not at or near the end of their useful life.

- *Ventilation and Infiltration*

Shut down ventilation systems in noncritical areas when unoccupied.

Shut off exhaust systems when not needed.

Install automatic ventilation controls to ensure areas are ventilated when necessary.

Connect ventilation fans in toilet rooms to light circuit.

Establish rules for all building personnel regarding opening and closing of exterior doors and windows.

- *Cooling*

Repair all leaks: chilled water, condenser water, conditioned air, duct tape, and so forth.

Turn off cooling system during unoccupied hours in noncritical areas.

Do not cool lobbies, passageways, and storage areas to the same degree as work areas.

Insulate chilled water piping and duct work located in areas that are not air-conditioned.

Eliminate or reduce the use of HVAC (heating, ventilating, and air-conditioning) systems that require simultaneous heating and cooling.

Reduce solar heat gain.

Rebalance chilled water and air distribution systems.

Raise chilled water temperature in accordance with load.

Operate condenser water system at lower temperature.

Operate the chilled water pump and cooling tower fans only as necessary.

Lock thermostats to prevent resetting by unauthorized personnel.

Maintain cooling equipment at peak efficiency. Visually inspect roof top systems just prior to cooling season.

Clean strainer screens in pumping systems.

Keep filters and heat transfer surfaces clean.

Use minimum number of chillers. It is better to operate one unit at 90 percent capacity than two at 45 percent capacity.

Install a central supervisory control system.

- *Lighting*

Reduce illuminations to levels consistent with productivity, safety, and security considerations. Scrutinize outside lighting.

Add switching and timers to turn off lights when not needed.

Use daylight for illumination in perimeter areas when practical.

Remove unnecessary lamps when those remaining can provide the desired illumination.

Use higher-efficiency lamps.

Move desks and other work surfaces to a position and orientation that will use installed luminaries to their greatest advantage.

Revise cleaning schedule so that lights can be turned off earlier.

Add photocell or time controls to operate outdoor lighting.

Keep lamps, luminaries, and interior surfaces clean.

Consider the use of light colors for walls, floors, and ceilings to increase reflectance. Avoid specular reflections.

- *Water Heating*

Repair all leaks. Check faucet washers and steam seals.

Reduce the quantity of water use.

Reduce generation and storage temperature levels to minimum needed.

De-energize booster heaters in kitchens at night.

De-energize hot water circulating pumps when building is unoccupied.

Install efficient nozzles and faucets.

Boost hot water temperature locally.

Locate water heater close to the point of use.

- *Miscellaneous*

Improve maintenance of motors, compressors, belts, and so forth.

Make sure electrical power is not bleeding off to ground.

Install demand-limiting equipment.

Close off unused areas and rooms when practical.

Disconnect refrigerated water fountains.

Adjust valves for minimal water use.

Wash and dry full laundry loads only.

Reschedule laundry work hours to avoid peak electrical demand.

Turn off infrared food warmers when no food is being warmed.

Preheat ovens only for baked goods.

Check sterilizer and refrigeration equipment doors for proper gasketing and function. Repair or replace as necessary.

Keep refrigeration equipment and condenser coils clean.

Check all refrigeration systems for correct refrigerant charge to avoid excessive compressor operation.

Electric utility bills comprise the largest portion of the district's utility expense. The key to reducing these bills is to reduce total usage during each billing period and during periods when rates are highest.

The primary means for controlling electrical consumption is turning off electrical equipment when it is not needed. Equipment consuming large amounts of electricity in a school district includes electric motors to power air conditioners, fans to circulate air, water pumps, and lights.

Electric motors are usually turned off by a time clock. Although sophisticated time clocks can be purchased, they are usually only capable of turning equipment off and on on a fixed schedule. For example, a time clock can be set to turn off an air-conditioning system every day at 4 p.m. and turn it on at 7 a.m. the next day. Time clocks can also be set to operate equipment Monday through Friday only. The disadvantages of such a system are obvious. Unless the time clocks are manually changed by maintenance personnel, equipment will operate on all weekday holidays, minimum days, and other occasions when the equipment is not needed. Most districts do not have the maintenance staff available to override time clocks manually at multiple sites.

Energy Management System

The past several years have seen the commercial development of computerized energy management systems that allow a school district to operate equipment only when needed. An energy management system includes the following components:

1. *Central minicomputer.* A central minicomputer is located at the district offices, generally in the maintenance department. The minicomputer includes the following components:
    a. A central processor controlling the energy management system
    b. Memory units that store the software necessary to operate equipment
    c. Software that allows district personnel to turn equipment on and off as desired
    d. Various accessory equipment, including computer terminals, that allow district personnel to monitor, control, and change the system
2. *Remote control panels.* Each building or site with electrical equipment to be controlled has at least one remote control panel. This panel is connected to the controls of each piece of equipment included in the energy management system.

The energy management system operates in the following manner:

1. Software is programmed to turn on or turn off specified equipment at a set time. At the scheduled time the minicomputer communicates with the appropriate remote control panel over a telephone line and instructs it to turn the equipment on or off.
2. Alternate programs are stored in the minicomputer. These programs allow district personnel to adjust equipment operating schedules to allow for weekday holidays, minimum days, and so forth. For example, a single instruction to the minicomputer could turn off all air-conditioning equipment, water pumps, and so forth at a site on a holiday falling on a Thursday. The normal equipment operating schedule would resume the following day.
3. The minicomputer can also be programmed to cycle equipment for additional reductions in energy costs. For example, an air-circulation fan, air-conditioning compressor, swimming pool filter pump, and so forth can be programmed to run 45 minutes only during each hour. Building occupants are generally not aware of the interruption of the equipment operation, but a significant reduction in daily electrical usage can result.
4. An additional reduction in electrical utility costs can be realized by programming the energy management system for "load shedding." The district's monthly electric bill is determined by a complex formula that includes total electricity consumption, the maximum amount of electricity used by the district at any one time during the billing period (peak demand), and the time of day when usage is heaviest. Load shedding permits the district to determine and adjust its peak demand and ensure that this predetermined demand level is never exceeded. The minicomputer is instructed to monitor the electrical consumption of the district or site. When the predetermined peak demand level is close, the minicomputer turns off selected equipment in a predetermined order to ensure that the target peak demand level is not exceeded. As electrical consumption falls, the minicomputer turns the equipment back on.

A district's capital investment in an energy management system can be considerable. Experience has shown, however, that this cost is generally recouped through reduced electricity bills during the first one to two years of operation. After this initial payback period, the savings continue. Districts without the capital outlay funds available to purchase the system may wish to explore the possibility of amortizing their costs over a period of years through a tax-exempt lease/purchase agreement.

In addition to reducing energy bills, the energy management system can concurrently provide other services to the district. Some of these services are monitoring and controlling building security and fire alarm systems; monitoring walk-in refrigerators and data processing facilities; and providing a computerized scheduling system for the maintenance department's preventive maintenance program.

Although the initial cost of an energy management system may be high, districts should be aware that every dollar spent on utilities is a dollar not available for instructional purposes, personnel costs, and the like. For this reason purchasing an energy management system should be given a high priority by each district.

Conservation of Lighting

Although school administrators and maintenance managers wish to conserve as much energy as possible, they often overlook the positive impact that energy conservation may have on the budget. In many schools it is possible to save 12 percent to 18 percent of utility costs through commonsense actions without any appreciable capital expenditure. The energysaving possibilities are greatest in buildings that were built 15 to 50 years ago. However, even new buildings provide opportunities to conserve energy.

A high percentage of the money many schools spend for utilities is for lighting. The following procedures can reduce the amount schools spend for lighting:

Educate personnel to turn lights off when not required.

Reduce lighting levels in the hallways, lobbies, storage rooms, and so forth.

In warehouses, large shops, and so forth, reduce or turn off lights that illuminate the entire room when only work stations need to be lighted.

Put parking lot lights on a timer and install photo cells to monitor footcandle power. A timer and photo cells can help to eliminate high lighting levels when supervision of traffic does not require high footcandle power.

Design parking lot lighting for two levels—one minimum level for security and one level for periods of high usage.

Use timers when practical to turn off lights during off-hours.

Have security report lights left on after hours.

Replace incandescent lights with fluorescent lights when usage warrants it.

Clean or replace diffusers to provide maximum transmission of light. Rooms with smokers must be checked more often.

Paint faded reflective surfaces with an acrylic reflective paint.

Provide fluorescent lamp shielding to reduce glare and to increase available light.

Consider use of T-bar suspended ceilings with relocatable lay-in fluorescent fixtures to position lights as needed.

Replace fluorescent lamps near the end of useful life. Consult with lamp manufacturer to determine this time.

Install additional light switches to selectively control light levels and areas.

Keep windows, skylight, walls, and ceilings clean.

Locate the work station that needs the best illumination close to a window. The viewing angle should be parallel to the window.

Modify existing fixtures to accommodate higher-efficiency lamps.

Lower the fixture mounting height when remodeling a building.

Convert incandescent parking lighting to mercury vapor or sodium vapor lamps.

Check light output regularly with a calibrated light meter. If the output of a group of lamps has fallen to 70 percent of original output, relamp all fixtures in the group. Fixtures must be clean. Dust and dirt can cut light output by as much as 30 percent.

Avoid multilevel lamps. The efficiency of a single-wattage lamp is greater than a multilevel one. Also, use one large lamp rather than two small ones. For example, one 100-watt incandescent lamp produces more light than two 60-watt lamps.

Equip all restrooms with individual on-off light switches so that the last person leaving the room can turn the lights off.

Review all lighting standards carefully. Light levels in most areas are almost always higher than needed. Many areas have five to six times more light than is actually necessary.

Take advantage of outside natural light in daylight hours whenever possible and whenever it is sufficient for the work task. Control various areas with light-sensitive switches when outside natural light is not adequate.

The electric lighting system should be designed to permit minimum visual performance equivalent to an effective sphere illuminance (ESI) of 55 footcandles on the student's task.[1]

Polarized lighting improves the quality of vision by reducing both veiled reflections and direct glare, thereby reducing the quantity of conventional footcandles required and meeting the desired ESI levels. Polarized lighting should be considered as a cost-reduction item for the long term.

Control of Hazardous Materials

A planned program of control of hazardous materials should be an integral part of a district's overall safety efforts. The practical goal is to remove or control hazardous materials to avoid injury or disease in school staff and students.

The first step in this program is the identification and detection of hazardous materials, including asbestos, polychlorinated biphenyls (PCBs), lead and other chemicals, pesticides, cleaning solvents, combustion gases, shop pollutants, wood and wood preservatives, and picric acid.

Identification and detection of hazardous materials can be accomplished through periodic site inspections and continuing observations. The school district should ensure that school facilities are safe from hazardous materials. To do so requires both continual inspections and prompt corrective action by knowledgeable personnel.

---

[1] *Facilities Performance Profile: An Instrument to Evaluate School Facilities*. Prepared by the Bureau of School Facilities Planning. Sacramento: California State Department of Education, 1978, p. 10.

School facilities can be inspected at any time without advance notice under the California Occupational Safety and Health Act (CAL/OSHA). Inspections may be made as the result of routine scheduling, employee complaint, or an industry study.

Once all school facilities have been inspected and hazardous materials identified, a plan of action for the control or removal of any materials which jeopardize the health and safety of pupils and school staff should be developed. In most instances maintenance and operations staff can be trained to remove or control these substances. A useful publication on hazardous materials, *Clean Your Room* (1982), may be obtained from the State Department of Consumer Affairs, 1020 N. St., Sacramento, CA 95814. Other publications are available from the U.S. Environmental Protection Agency (EPA), 401 M St., Washington, DC 20460.

Concern in both the federal and state legislatures is growing regarding substances which may be toxic to human beings. Federal and state legislation has been passed specifically dealing with hazardous materials, and it is necessary for school districts to comply with both the letter and intent of these laws.

The State Department of Health Services is the agency best able to provide the necessary health expertise. The *Education Code* specifically allows a school district to contract with its local health department for the types of services needed.

Exposure to Asbestos

Exposure to asbestos fiber can increase the risk of developing certain diseases over a period of years. The four diseases associated with inhalation of asbestos fiber are asbestosis, a disease of the lungs caused by inhaling asbestos particles; cancer of the lung and cancer of the digestive tract; and mesothelioma, a rare cancer of the lining of the chest or abdominal cavities.

Reduction of asbestos fiber exposure is the only method for preventing disease. When the fiber levels are low, the risk to humans and the incidence of related diseases are low.

The Environmental Protection Agency (EPA) is concerned about asbestos-containing materials that were used in the construction or renovation of many schools throughout the nation. EPA has organized a joint federal, state, and local effort to identify and correct exposure problems caused by asbestos in the schools. Their primary role is that of technical assistance to states and school districts. In addition, EPA acts as a clearinghouse for federal and state agencies and for schools. EPA's program is coordinated with the National Institute for Environmental Health Sciences, the National Institute for Occupational Safety and Health, the Occupational Safety and Health Administration, and the Consumer Products Safety Commission. In California, questions about asbestos should be directed to the asbestos coordinator, EPA Region IX, 215 Fremont St., San Francisco, CA 94105.

Under Public Law 96-270 (1980) the California State Department of Education is required to oversee the detection of asbestos building products thought to be hazardous to the health of schoolchildren and the removal of such products from the schools.

Distribution of information; participation in workshops; and development of lists of qualified inspectors, testing laboratories, and contractors are required. Comprehensive records must be developed and maintained, and information summaries must be forwarded to the federal government.

School districts are required to take the following steps to be in compliance with the Toxic Substances Control Act (PL 94-46, 1976):

1. Inspect each school facility to locate all friable material.
2. Test suspected material for asbestos content.
3. Maintain a record of the inspection, testing, warning, and notification actions in the district's files.
4. Warn and notify employees and parent-teacher associations on forms provided by the EPA.

Protection from Asbestos

Protective measures recommended by CAL/OSHA and EPA to reduce asbestos hazards to a minimum are presented as follows:

1. *Basic principles.*
   a. Keep the amount of fibers released to a minimum.
   b. Protect yourself and others from fibers that may be released.
2. *Work methods*
   a. Work the asbestos wet. Asbestos should be thoroughly wet before it is handled. Wetting may be done with a hand sprayer for small areas, a Hudson-type sprayer for larger areas. Asbestos should be wet prior to any cutting, lifting, carrying, or packing. If asbestos is cut with a knife or handsaw, the material should be wet during the cutting process.
   b. Work small areas. Asbestos does not absorb water. Only the amount that can be wet should be worked. A small amount of detergent added to the water will increase the wetting effect.
   c. Work slowly and carefully. Asbestos should be handled so that it does not break up more. Large pieces should be gently lifted and placed in the disposal containers. The pieces

should not be broken with a hammer, dropped, thrown into barrels, and so on.

d. Keep the area clean. Loose particles created by the removal process should be constantly cleaned up with a special vacuum or with wet rags.

3. *Personal protection*

   a. Respiratory protection. Masks to prevent the inhalation of asbestos fibers must be worn. The three types that are suitable are as follows:

      (1) A disposable mask, such as 3M 8710, may be used where the exposure to asbestos is minimal. Such exposure occurs on small jobs, such as the removal of a small section of pipe insulation or work on nonasbestos materials in an area in which there is some loose asbestos.

      (2) A full-face mask without supplied air may be used when exposure is not large but where many hours of exposure will occur.

      (3) A full-face mask with supplied air or a self-contained air supply may be used when exposure to loose asbestos may be high. Such exposure might occur in boiler room removals, removal of large segments of pipe, or removal from a large ceiling.

   In each case the mask should be properly fitted. Employees with beards will not be able to obtain a proper fit.

   b. Body protection. Employees must wear disposable coveralls approved for asbestos work. The head should also be covered with an attached hood or a separate disposable head-covering. This protection must be changed each time the employee leaves the work site.

   c. Personal hygiene. Employees should wash their hands each time they leave the work area. Smoking, eating, or drinking are not allowed in the work area. Clothing worn under the disposable coveralls must be washed separately.

4. *Area protection*

   a. Walls and floor. The walls and floor in the immediate work area must be covered with polyethylene sheeting (Visqueen). Floors must have a 2-mil or 3-mil covering. Walls may be covered with 1-mil sheeting.

   b. Immovable equipment. Equipment that cannot be moved out of the area (including fixtures, pipes, and so forth) and that may collect dust must be covered with polyethylene sheeting.

   c. Windows and doors. Windows, doors, and vents through which loose asbestos could vent to the outside must be covered. The one door used for access to the work area must have an overlapping of polyethylene. The overlap must be large enough so that no direct air flow is allowed. Doors and windows not used for access to the work must be locked shut.

   d. Vents. Vents for air handling equipment must be sealed off.

   e. Signs and barricades. Entry to the work place must be posted with the words *Caution: Asbestos Dust Hazard.* Each maintenance tool room should have these signs in stock. Additional signs and barricades should be posted if there are several entries to the work area.

5. *Disposal of asbestos*

   a. Clean-up. A special high-efficiency particular filter (HEPA) vacuum must be used to remove asbestos dust and particles. Each maintenance area should have a five-gallon model of this vacuum. For large jobs a special vacuum which attaches to a 55-gallon drum should be available. Hard surfaces, such as nearby pipes and fixtures, should be wiped down with damp rags. These contaminated rags must be disposed of with the other asbestos waste.

   b. Bagging and storage

      (1) Asbestos waste is to be placed in 6-mil plastic bags or double 3-mil plastic bags. A caution sign must be stenciled or labeled on the bag.

      (2) Plastic bags that contain waste must be securely and tightly sealed with tape.

      (3) Plastic sheetings (Visqueen) used for area protection must also be disposed of in sealed plastic bags with the other asbestos waste.

      (4) Fiber or metal drums may also be used for disposal. They are recommended by the Environmental Protection Agency (EPA) but may not be required at some dump sites. However, if the wet asbestos dust is too heavy for the bags, drums may be preferable for transportation and storage.

   c. Disposal

      (1) Asbestos waste may only be transported in a vehicle that is registered for hauling

hazardous waste.

(2) In most cases temporary storage of asbestos may be necessary, and an approved temporary storage place should be arranged.

(3) For large removal jobs it is preferable to contract with an outside hazardous waste transporter for a dumpster and haul to an official dump site.

6. *Requirements for typical jobs.* Because each asbestos job is different, the work methods and protection should be adapted to the job. This section contains work requirements for typical jobs found in school districts:

   a. Work in an area where loose asbestos is present but the work itself does not involve asbestos, such as running a new line under a building or placing an electrical installation in a tunnel. Workers should:

      (1) Post warning signs at the entry to the area.
      (2) Use wetting procedures and full personal protection. Remove large pieces of asbestos and pack in plastic bags for disposal.
      (3) Wet the ground along the access route and around the work area. Cover the access route and work area with double thickness of Visqueen.
      (4) Wear disposable face masks if desired. Disposable coveralls are optional.
      (5) Leave Visqueen in place after the job is completed if so desired.

   b. Emergency or small repair involving the removal of asbestos

      (1) Post warning signs at entry.
      (2) Spread Visqueen on floor or work area and on top of any equipment or materials in the immediate area that cannot be moved.
      (3) Wear respiratory protection and disposable coveralls.
      (4) Wet the asbestos material to be removed.
      (5) Cut into the asbestos at a seam if possible.
      (6) Provide continual wetting at point of cut.
      (7) Remove material in large pieces insofar as possible.
      (8) Scrape or wipe down surface after large parts of asbestos are removed.
      (9) Place all removed asbestos in proper bags.
      (10) Wipe down areas adjacent to removal and dispose of rags in sealed bags.
      (11) Roll up Visqueen carefully and dispose of in sealed bags.
      (12) Label bags or containers and ship for storage as required.

   c. Removal of asbestos-covered pipes

      (1) Post warning signs at entry.
      (2) Spread Visqueen on floor of work area and, where needed, on walls and equipment adjacent to work area.
      (3) Wear respiratory protection and disposable coveralls.
      (4) Cut pipe and asbestos at existing seams in insulation if possible.
      (5) Provide continual wetting at point of cut.
      (6) Remove pipe segment carefully, wrap it in double-thick Visqueen, and seal the ends.
      (7) Seal exposed asbestos at ends of pipe sections left in place. Asbestite, Arabol, or similar materials may be used to seal. *Note:* It may be possible to remove one very large section of pipe from an awkward position (such as from overhead) and cut it up into smaller segments on the floor of the work area.
      (8) Dispose of pipe segments as sealed pieces.
      (9) Roll up Visqueen covering on floor, wall, and equipment and dispose of in sealed bag.
      (10) Wipe down or vacuum work area.

   d. Removal of asbestos from large areas (wall, ceilings, boiler rooms)

      (1) Post warning signs at entry.
      (2) Cover all openings in wall and ducts with polyethylene sheeting (minimum 1 mil).
      (3) Cover all areas of wall and floor where no asbestos will be removed with polyethylene sheeting (minimum 1 mil).
      (4) Provide an overlapping section of polyethylene at the entry to the area.
      (5) Provide a change area between the work area and the outside. This change area must be clearly separated from the work area and sealed off from the work area.
      (6) Use the change area for putting on protective equipment.
      (7) See that employees use this area and change disposable protective equipment each time they leave the work area.
      (8) At the end of the job, treat the materials in the work area (e.g., Visqueen, used

rags, and so forth) as contaminated and dispose of properly.
(9) Wear respiratory protection and disposable coveralls.
(10) Wet down one small area at a time.
(11) Remove the asbestos from this area and place in disposing bags or drums.
(12) Wipe down subsurface with wet rags. As work area expands and equipment, such as ladders and scaffold, is moved, vacuum loose materials near finished areas.
(13) Wipe down subsurfaces again after all removal is finished.
(14) Wipe down equipment and remove to outside through change room.
(15) Remove, fold, and dispose of Visqueen coverings carefully.
(16) Vacuum work area.
(17) Dispose of contaminated materials as required.

Polychlorinated Biphenyls (PCB)

Polychlorinated biphenyls (PCB) is a chemical compound that has been used extensively in electrical insulation, especially in industrial equipment such as transformers and ballasts. Production of PCB has been halted, but the compound is still found in existing utility equipment and systems. Identified as a health hazard and associated with skin diseases, liver disorders, and damage to the nervous system, PCB is strongly suspected of causing cancer.

An electrical transformer is essentially a large sealed, oil-filled cylinder. This oil may contain PCB. As long as the cylinder remains sealed, does not leak, and is not opened for servicing, EPA rules allow the use of the transformer indefinitely, provided it has been properly labeled. When the transformer leaks and PCB is identified or assumed, the oil, together with the necessary seals, must be replaced in accordance with strict EPA procedures. As an alternative, the entire transformer may be replaced. (Replacement may also be done as a precautionary measure, even though the transformer is not yet leaking. Fluorescent lamp ballasts may be similarly treated.)

Federal regulations require certain inspection, testing, identification, classification, and recordkeeping activities by the owners of electrical transformers, including school districts, if districts own such equipment.

Each PCB spill must be reviewed carefully to determine the best course of action to protect health and the environment. In addition, disposal of PCB must be in accordance with strict EPA procedures. Further information can be obtained from local health departments or from the Hazardous Waste Management Branch, State Department of Health Services. The following recommendations are offered as guidelines for managing a typical liquid PCB spill:

1. *Spillage on cement or concrete surfaces.* All free-flowing material should be contained and removed with absorptive materials, such as sawdust. Next, the surface should be scrubbed with rags or cloths soaked in a recommended solvent, such as xylene, toluene, or kerosene. Never hose down PCB with water. All rags, debris, and contaminated materials should be deposited in a 55-gallon drum for subsequent disposal.
2. *Spillage into soil.* All contaminated soil should be removed immediately and deposited in a disposal drum. Although there are no hard-and-fast rules for determining the depth of soil to be removed following PCB contact, good judgment should be used to determine the depth of penetration of the chemical during the time period since initial contamination. Test samples of soil are not necessarily required; however, they are recommended to evaluate the extent of penetration.
3. *Spillage on vegetation.* Contact with lawns necessitates the removal of the entire area of grass and at least two inches of underlying soil. Remove and dispose of all bushes and nongrassy plants contaminated with PCB. Large trees contaminated as a result of a ruptured pole-mounted capacitor should be trimmed of those branches and leaves that are visibly contaminated.
4. *Spillage on nonremovable, nondisposable items.* Frequent spillage occurs on equipment or articles in the vicinity of PCB equipment. Good judgment regarding clean-up should prevail. Surfaces should be scrubbed with solvent and cleaned as well as it is reasonably possible. However, some items, such as automobiles and trucks, cannot be cleaned with solvent because of potential damage to their protective finishes. In these situations dry cloths should be used to collect as much contamination as possible.
5. *Spillage into swimming pools.* PCB spillage into swimming pool water happens frequently in southern California. Because of the many private outdoor swimming facilities in this region, frequent failures of pole-mounted PCB units have caused many instances of contamination. Under such circumstances, responsible parties should contact the EPA for procedures on skimming floating surface contamination and suctioning PCB precipitate from the pool bottom. Under no circumstances should contaminated pool water be drained out without contacting the EPA.
6. *Disposal of spilled cleaning materials.* When scrubbing contaminated areas with solvent, do

not generate large volumes of waste solvent. This liquid will contain significant concentrations of PCB and be subject to stringent disposal requirements. Clean-up personnel should wear as much disposable protective equipment as possible to alleviate time-consuming decontamination procedures and prevent the generation of large volumes of contaminated rinsewater, which is subject to specific disposal requirements. All contaminated soil, debris, absorptive materials, rags, and other solids must be placed in a 55-gallon drum and taken to an EPA-approved landfill as soon as possible.

7. *Rules to remember.* Accidental spillage of PCB constitutes improper disposal, and owners or responsible parties are required to remove as much PCB as is reasonably possible. Spillage of PCB material constitutes a dilution of the original. Even though test samples taken from a spill zone might indicate concentrations below most levels regulated by federal law, the spillage should be cleaned up. In addition, deliberately solidifying or diluting concentrated PCB liquids to avoid stringent incineration requirements is strictly forbidden.
8. *EPA-approved chemical waste landfills.* Information regarding the location of EPA-approved waste landfills is available from the EPA Region IX, 215 Fremont St., San Francisco, CA 94105.

Control of Pests

Pest control is the control of biotic agents that damage plants or structures or pose a health or nuisance problem to the school staff members, students, or members of the community.

Methods of controlling pests involve two general approaches—cultural control and chemical control. Cultural approaches are preventive and should be the school's top priority. Cultural control practices for plants include buying disease-resistant plants when possible; thinning, pruning, and proper spacing and location of plants; watering in the morning; and properly removing and destroying cuttings and plant debris. Cultural control for weeds involves hand pulling, hoeing, mowing, plowing, and disking.

Cultural control practices involving insects, birds, and rodents include modifying buildings to preclude entry; eliminating hiding and breeding places; decreasing food and water sources; and setting traps.

Chemical control approaches should be considered when infestation is so heavy that preventive measures may not be timely or may not work. Chemicals are designed to be effective for specific pests, including weeds, and diseases; and they must be selected accordingly. Because most chemicals are toxic, they should be handled carefully. Directions should be followed, and the chemicals should be kept in a safe location away from students, teachers, and other staff members.

The use of some chemicals is restricted, and federal and state laws and regulations have been enacted to control their use.

Laws and Regulations

At the national and state levels, government enacts laws and regulations concerning pesticides and their use in pest control. At the federal level Congress passed and then amended in 1978 the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA). FIFRA required the Environmental Protection Agency (EPA) to classify all pesticide products for either general or restricted use and required the states to develop and administer a program to certify those who use restricted pesticides.

In response the California Legislature passed laws governing pesticide use, and the California Department of Food and Agriculture administers them. That department also administers a testing program that certifies successful candidates as pest control operators and applicators or certified commercial applicators. Only those individuals are allowed to use pesticides labeled "restricted use." (In addition, some restricted materials can only be used by obtaining a restricted materials permit.) The department also publishes the *California Department of Food and Agriculture Laws and Regulations Study Guide* primarily to assist those who wish to be licensed to handle restricted use pesticides. The guide contains useful information about laws and regulations applicable to pesticide use and is available from the California Department of Food and Agriculture, 1220 N Street, Sacramento, CA 95814.

The county agricultural commissioners are responsible for the actual enforcement of these laws and regulations. In the three counties that do not have commissioners—Alpine, Mariposa, and Trinity—the Director of Food and Agriculture is responsible. The county agricultural commissioners are also responsible for issuing restricted materials permits in order to use pesticides classified as restricted. These permits can only be issued to certified commercial applicators.

Several other state agencies are also involved with enforcement of pesticide law and regulations: the Department of Fish and Game; the Department of Health Services; the State Water Resources Control Board; the Air Resources Board; and the Department of Industrial Relations, Occupational Safety and Health Division.

Pest Control Safety

Safety is the most important part of any pest control program.The well-being of the community, students, and other people involved in the schools is paramount. All regulations are centered on this premise. All safety procedures and equipment should be utilized. Personnel who are assigned the task of applying pesticides must be trained for this work, including appropriate safety training. Those who are assigned the task of applying restricted pesticides and those needing a permit must be tested and certified as applicators by the California Department of Food and Agriculture. The local county agricultural commissioners will, in most cases, provide training classes for school personnel. The Consultation Services Field Offices, California Occupational Safety and Health Consultation Services Division, offers assistance in regard to safety orders on this subject. The California Department of Food and Agriculture administers testing for pesticide applicator certification. School districts should ensure that at least one grounds maintenance employee be licensed as a certified commercial applicator and consider making certification a requirement for promotion.

Because many schools may use restricted materials to control pests, schools will be severely hampered in their pest control operations unless grounds maintenance personnel are licensed to handle restricted materials. In addition, the process for certification will introduce grounds maintenance personnel to the generally accepted methods and procedures for pest control.

Pests in and Around Schools

Some common pests found in and around schools include birds, ants, roaches, rodents, beetles, flies, bees, wasps, hornets, lawn moths, cutworms, termites, and various insects that attack plants and foliage around schools. In addition, weeds—plants that are growing where they are not wanted—can also be classified as pests. In addition, plants may exhibit symptoms of disease caused by bacteria, fungi, or a virus, and birds and rodents may pose a health hazard.

The many procedures for controlling these pests can be simple or complex and depend on the location, severity of infestation, time of year, and other environmental conditions. Some pest problems can be cleared up by using cultural controls, and others demand chemical controls. Grounds maintenance personnel who have been certified as commercial operators should have general knowledge about various pest control methods. However, detailed information on pest control for plants is available in *Westcott's Plant Disease Handbook* (Fourth edition), revised by R. K. Horst (Van Nostrand Reinhold, 1979) and in *Diseases and Pests of Ornamental Plants* (Fifth edition), by Pascal P. Perone (John Wiley and Sons, 1978). Specific information for pest control for insects, rodents, and birds is available in *Handbook of Pest Control* (Sixth edition), by Arnold Mallis (Franzak and Foster Co., 1981); and *Urban Entomology*, by Walter Ebeling (University of California, 1975).

In addition, the University of California, Division of Agricultural Sciences, Berkeley, publishes leaflets that contain general information on gardening, agricultural chemicals, and methods of pest control as well as detailed information on controlling specific pests. A list of publications is available from the University of California, Division of Agricultural Sciences, Berkeley, CA 94720.

School Safety and Security

School officials and members of the community share their concern over the costs of theft, arson, vandalism, and burglary. Not only are the monetary costs staggering, but the impact of these crimes is also felt in the lives of pupils and school personnel.

The California State Department of Justice has published two handbooks which can help school administrators address the complex problems of school safety and security. One handbook is entitled *School Security Handbook: Get a Handle on a Vandal* (1981). The other handbook is entitled *Alternatives to Vandalism: Cooperation or Wreckreation* (1981). Both of these publications are available free of charge from the Crime Prevention Center, Office of the Attorney General, Suite 583, 1515 K St., Sacramento, CA 95814, and can be used as guides for ideas to be adapted to meet local needs. The handbooks deal with important issues in school safety and security, such as employing general measures against vandalism and theft, identifying security needs, planning a prevention program, involving students and community members in prevention programs, and using security checklists.

The essential ingredient in improving school safety and security is involvement on the part of school personnel, pupils, and the general community. The *School Security Handbook* lists prevention techniques that have resulted in controlling vandalism, including:

1. Keeping the school occupied
2. Keeping the school under surveillance
3. Controlling access to the school
4. Designing or modifying the school with crime prevention in mind
5. Repairing any damage immediately
6. Working with the courts and law enforcement agencies
7. Considering restitution and prosecution

Although the problems associated with school safety and security are complex, positive steps can be taken toward solving those problems. A comprehensive and systematic approach must be established under the direction of a knowledgeable school administrator.

Security Alarm Systems

Security alarm systems are necessary in most school facilities. The amount of protection required depends on the location of the facility and the assessment of the incidence of intrusions in the local area. Once the decision has been made to secure a facility with an alarm system, careful consideration should be given to selecting one system from the wide variety of devices available. Many types of alarm systems are available. One system utilizes infrared beams that activate an alarm when the invisible beam is crossed by an intruder. Other devices are activated by unusual noises or motion. Purchasing a system that is connected to police headquarters or a central location so that the police will be summoned immediately in the event of a break-in should be considered. In some locales the entire school campus may not need to be protected. Instead, a security system to protect areas in which expensive equipment is stored may be adequate.

Fire Protection

Fire is one of the greatest hazards to a school. The best protection against fire is a sound program of maintenance and an automatic fire detection system.

Sprinkler systems are expensive to install in new or existing facilities; however, the savings from reduced insurance premiums will allow the cost of the system to be amortized over several years. Some sprinkler systems are activated by photoelectric and ionization detectors, which will also sound an alarm when the fire is in the early stages.

Another type of fire detection system is the thermal detector. Thermal detectors are placed in the ceiling and are activated when room temperature rises beyond normal levels. These detectors are equipped with batteries so that the system will function during power failure.

Either a sprinkler system or a thermal detector system should be connected to the fire department so that help will be summoned within the protected area.

Safety Rules and Regulations

The establishment of school rules and regulations by the district educational administrators will assist the maintenance and operations department in providing a safe, comfortable environment for students and staff. One rule of particular concern to maintenance and operations departments should be strictly enforced—a ban on graffiti. Graffiti placed on walls or in classrooms should be removed immediately. A staff member should paint over any graffiti early in the morning before students arrive on campus.

Another important rule to establish is designed to make students responsible for keeping the school campus clean. A rule against littering, together with the enforced consequence of campus clean-up duty for offenders, can accomplish a number of important things. When students realize that the administration is serious about a clean environment, students will begin to take pride in their school. In addition, students who litter and are then required to pick up trash and litter on campus will not only be an example for other students but will also likely remember to put litter in its proper place on a regular basis. A clean campus is a deterrent to graffiti and vandalism.

Access for the Handicapped

On April 28, 1977, the Secretary of Health, Education, and Welfare issued regulations implementing Section 504 of the Rehabilitation Act of 1973. The law states that "no otherwise qualified handicapped individual in the United States shall, solely by reason of his handicap, be excluded from the participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving federal financial assistance."

Accordingly, school buildings that have architectural barriers that prevent access by the disabled should be modified in varying degrees. The federal government has adopted the standards of the American National Standards Institute as a mandatory building code for the removal of architectural barriers. Generally termed performance standards, they specify the general criteria of performance expected in a building as opposed to giving hard-and-fast technical dimensions and requirements for every design element.

Designers and administrators using the American National Standards Institute standards to survey their facilities for barriers should keep two key points in mind. The American National Standards Institute standards should be compared with requirements or other enacted state and local barrier-free design codes to ensure compliance with the most restrictive requirements. The local building inspection office will assist in the determination of which code applies to school district facilities. When improvements for access can be made which are better than the minimum requirement without incurring appreciably higher costs, these improvements should be made to eliminate, to the degree possible, renovations in the future.

Designers and administrators should realize that building codes, standards, and federal regulations do not require that all facilities comply with specific requirements for barrier removal. What is required by the federally adopted regulation is that the programs or services be accessible to all people, including the handicapped. Simply stated, buildings which are used by the public for any normal purpose, such as employment, education, and recreation, should be accessible.

A number of changes can be made that provide access to programs or activities without requiring structural changes to existing facilities. Humane treatment and reasonable access for handicapped individuals in the most appropriate integrated setting are the goals of these regulations.

A checklist of activities may be used to produce a transition plan and should be kept on file at the district office for public inspection. Recommended activities include the following:

1. Identify the person responsible for preparing the transition plan.
2. Select a compliance team. Team members might include board members, public advisory committee members, site principals, and maintenance or facilities directors and should include handicapped members or organizations representing disabled persons or both.
3. Provide compliance team members with site plot plans, facilities accessibility checklists, and a procedural review.
4. Conduct a compliance team visit and walk through each district facility, using the plot plans and the facilities accessibility checklist to make appropriate comments about physical obstacles that limit accessibility to handicapped persons.
5. Develop a priority listing of projects to be completed, together with estimated starting dates and estimated costs.
6. Prepare a transition plan report for board approval and implementation.

In any conflicting governing code—federal, state, municipal, or district—the more stringent requirement must govern. Laws apply to pupils and employees, and it is the district's responsibility to comply with those laws. The following checklist can be used to identify problems that need to be resolved:

Passenger Arrival

☐ Adequate place

Parking

☐ Identified parking
☐ Accessibility to buildings by level or ramped path

Walks

☐ Minimum width of 48 inches
☐ Maximum gradient of 5 percent
☐ Firm, nonslip material
☐ No gratings, manholes, and so forth
☐ Curb cuts at streets
☐ Curb cuts at driveways
☐ Curb cuts at parking lots
☐ Level platforms at doors (with one-half inch maximum differential)

Ramps

☐ Maximum gradient of 8.33 percent (one-foot rise in 12 feet)
☐ Firm, nonslip surfacing
☐ No gratings
☐ Level approaches, landings at 30-foot intervals
☐ Handrails, 32 inches high and extending 12 feet beyond ramp
☐ Guardrails on wall
☐ Good illumination

Entrances

☐ At least one major entrance near the front of the building accessible by wheelchair
☐ Level-approach platform

Doors

☐ Clear opening at a maximum of 32 inches wide
☐ Single effort with 8 pounds pressure maximum
☐ Level approaches and clearance at sides of door
☐ Vestibules with a separation of 6 feet 6 inches between doors
☐ Thresholds flush or beveled at 8-percent maximum slope
☐ Kickplates, 16 inches high
☐ Closers with time delay and 8 pounds maximum tension
☐ Handles at a maximum of 42 inches high
☐ Vision panels at a maximum of 36 inches above floor

Corridors, Public Spaces, and Work Areas

☐ Corridors, 60 inches minimum width
☐ Recessed doors when opening into corridors
☐ Floors on common level
☐ Nonslip floor materials

Stairs and Handrails

☐ Minimum width of 42 inches
☐ Maximum risers of 7 inches
☐ Nonprojecting nosings
☐ Nonslip treads
☐ Level, differentiated approaches
☐ Handrails, 32 inches high and 18 inches beyond top and bottom steps
☐ Good illumination

Elevators

☐ Accessibility to each floor level
☐ Cab size at a minimum of 51 inches by 68 inches
☐ Door to clear opening at a minimum of 32 inches
☐ Handrails, 32 inches high
☐ Automatic and self-leveling doors with safety closing devices
☐ All controls at a maximum of 48 inches from floor

☐ Controls and signals usable by blind persons
☐ Emergency routes and plans
☐ Emergency telephone

Toilet Facilities

☐ Minimum one per sex per floor and so identified
☐ Entrance clearances (door widths, vestibule size)
☐ Floor level with corridor
☐ Side transfer compartment, 66 inches wide by 60 inches deep
☐ Compartment, 42 inches by 48 inches in front of fixture
☐ Grab bars at side of water closet, 33 inches high
☐ Wall-hung water closet, 15 inches to 16 inches high
☐ Lavatory with 29 inches clear space underneath
☐ Faucets easily operated, pipes insulated, enclosed, or above knee level
☐ Urinal wall-mounted at 19 inches or at floor level
☐ Mirrors, shelves, and dispensers usable from lavatory at 40 inches maximum height
☐ Shower stalls with folding seats, grab bars, special controls

Drinking Fountains

☐ Minimum one per floor for handicapped persons
☐ Hand level operated with up-front jet and controls
☐ Wall-mounted projecting basin at 33 inches maximum height
☐ Alcoves, 60 inches wide if used

Public Telephone

☐ At least one telephone per bank accessible to the public
☐ Dial, handset, and coin slot at a maximum of 54 inches high
☐ One telephone per bank for hard-of-hearing

Controls

☐ Alarms, switches, and so forth within 48 inches of floor

Identification and Warning

☐ Access symbol displayed at entrances
☐ Raised numerals, 60 inches high at sides of doors
☐ Knurled door handles at danger areas
☐ Abrasive floor strips at open danger areas
☐ Warning signals both visible and audible
☐ Construction site barricades

Special-Use Spaces

☐ Dining areas: access and clearances
☐ Spectator spaces: wheelchair stations
☐ Laboratories: wheelchair stations
☐ Libraries: wheelchair access and clearance
☐ Audiovisual control rooms: access

88

Appendix A

Selected Legal References

Appendix A contains excerpts from selected sections of the *Education Code* and the *California Administrative Code, Title 5, Education.* These sections outline the governing board's responsibilities for maintaining and operating school facilities.

Education Code sections

17714. The Board [State Allocation Board] shall require the school district to make all necessary repairs, renewals and replacements to insure that a project [facilities constructed, remodeled, or replaced under the State School Building Lease-Purchase Law of 1976] is at all times kept in good repair, working order and condition.

35293. The governing board ... shall maintain all of the elementary day schools established by it, and all of the day high schools established by it....

39211. ...The Legislature intends that the governing board of each school district adopt a plan for the orderly repair, reconstruction, or replacement of school buildings not repaired, reconstructed, or replaced....

39600. The governing board ... shall manage and control school property within its district.

39601. The governing board ... shall ... repair ... the school property of its districts....

39610. The governing board of every school district shall provide a warm, healthful place in which children who bring their lunches to school may eat the lunches.

39618. (a) The governing board ... may establish an account to be known as the "district deferred maintenance account" for the purpose of major repair or replacement of plumbing, heating, air conditioning, electrical, roofing, and floor systems and the exterior and interior painting of school buildings or the inspection, sampling, and analysis of building materials to determine the presence of asbestos-containing materials, the encapsulation or removal of asbestos-containing materials and any other items of maintenance approved by the State Allocation Board. ... (b) Funds deposited in the district deferred maintenance account shall only be expended for maintenance purposes as provided pursuant to subdivision (a).

39619. (a) Whenever a school district has budgeted ... in its deferred maintenance fund ... an amount equal to, or greater than, that amount the district expended from its general fund for major maintenance, repair, or modernization of existing school buildings ..., the Superintendent of Public Instruction shall so certify to the State Allocation Board.

39620. Each district desiring an apportionment pursuant to Section 39619 shall file with the State Allocation Board and receive approval of a five year plan of the maintenance needs of the district over such period. This plan may be amended from time to time. Any expenditure of funds from the district deferred maintenance fund shall conform to the plan approved by the State Allocation Board.

39630. The clerk of each district, except a district governed by a city or city and county board of education, shall, under the direction of the governing board, keep the schoolhouses in repair ... and exercise a general care and supervision over the school premises and property during the vacations of the school.

40052. The governing board ... may appoint a person who shall have charge of the grounds, preserve order, [and] protect the school property....

40055. Lighting, heating, janitor service, and the service of the person when needed and other necessary expenses in connection with the use of public school buildings and grounds ... shall be provided for out of the county or special school funds of the respective school districts in the same manner and by the same authority as similar services are provided for.

California Administrative Code, Title 5, Education sections

630. Governing boards ... are responsible for the sanitary, neat, and clean condition of the school premises and freedom of the premises from conditions that would create a fire or life hazard.

631. ... all buildings and grounds shall be maintained according to the regulations of the Board of Health having jurisdiction over the school district.

Appendix B

Time Schedules

Appendix B contains time schedules that are necessary to use the CASBO formula, the San Joaquin task-time frequency formula, the Denver custodial formula, and the area allotment per person-hour formula. The formulas are described in Chapter 4.

The CASBO Formula

The CASBO formula is summarized as follows:

One custodian for each eight teachers (teacher factor)

plus

One custodian for every 225 pupils (pupil factor)

plus

One custodian for every 11 rooms to be cleaned (room factor)

plus

One custodian for every 15,000 square feet of building area (square footage factor)

divided by

Four, to indicate the number of custodians required for the building

The following examples illustrate how the CASBO formula should be applied. They include instructions on the procedures to be used.

Teacher factor. Given: One custodian for every eight teachers.

Number of teachers ÷ 8 = teacher factor (Carry out to two decimal places.)

To determine the number of teachers, count each teacher who has a classroom for a full day. Also count each teacher who does counseling part time, provided this person has an office or area that must be cleaned each day. (Do not count this teacher if he or she uses a classroom that is used by some other person who has already been counted.)

Pupil factor. Given: One custodian for every 225 pupils.

Number of pupils ÷ 225 = pupil factor (Carry out to two decimal places.)

To determine the number of pupils, count only those pupils who are in day school unless the areas used are cleaned before and after night school classes. Count all pupils in double sessions.

Room factor. Given: One custodian for every 11 rooms to be cleaned.

Number of rooms ÷ 11 = room factor (Carry out to two decimal places.)

To determine the number of rooms, estimate 1,000 square feet as the floor space for an average room. Using this as a divisor, break up large areas and large rooms (gymnasiums, multipurpose rooms, inside corridors, and the like) into room areas equivalent to the average. Add the areas of smaller rooms together (rooms with floor areas of less than 800 square feet) and divide the sum by 1,000 square feet to determine the number of average-size rooms.

Count any room that has between 800 and 1,200 square feet of floor area as one room. Count all rooms—class, storage, custodial, or other—*only if they are cleaned each day.* Do not count closets or storerooms that are cleaned only during vacation periods.

Square footage factor. Given: One custodian for every 15,000 square feet.

Total square feet of building area ÷ 15,000 = square footage factor (Carry out to two decimal places.)

To determine the square footage, add square footage of all areas that are cleaned each day, including outside corridors and walks if they are swept daily by a custodian. Do not include areas, such as storerooms and floors, that are not cleaned each day.

Total custodial staff required.

Total of the four factors (a, b, c, d) ÷ 4 = number of cleaning custodians needed (Carry out to two decimal places.)

An actual time study is needed to determine how much time the governing board and the administration wish to allot to gardening and landscaping. If the custodian's job description requires him or her to do some grounds work, then the time needed to care for grass and shrubbery, to do watering, and to clean paved areas must be allowed. By adding this time to the total allowed in the formula, the actual amount of time required for custodial care can be determined.

When assigning jobs and areas, administrators will need to remember that larger rooms can be swept and cleaned much faster than several smaller rooms of the same total area. Gymnasium floors can be swept at the rate of 200 square feet per minute; the average rate for small classrooms is 52 square feet per minute. After a few adjustments of individual assignments are made to equalize the work, all custodians should be able to finish their cleaning duties at approximately the same time.

San Joaquin Task-Time Frequency Formula

Custodial Elemental Standard Times

Work description	*Minute standard*	*Per unit*
1. Dust-mop office and classroom floors.	1.46	100 square feet
2. Vacuum light soil.	1.32	100 square feet
3. Vacuum heavy soil.	2.31	100 square feet
4. Wet-mop terrazzo and tile floors.	1.90	100 square feet
5. Vacuum heavy soil (traffic areas).	.18	100 square feet
6. Sweep concrete or tile surface.	.86	100 square feet
7. Dust-mop, dust, and clean office area.	2.60	100 square feet
8. Vacuum, dust, and clean office area.	2.60	100 square feet
9. Wash and store built-in lunch tables.	1.20	each
10. Wash, collapse, and stow portable lunch tables.	1.00	each
11. Store or set up built-in lunch tables.	.77	each
12. Clean chalk tray and chalkboard.	2.32	each
13. Clean classroom sink and drainboard.	1.73	each
14. Clean sink and counter top.	2.60	each
15. Clean lavatory, dispensers, and mirrors.	1.54	each
16. Clean urinals.	1.16	each
17. Clean stools.	1.73	each
18. Do classroom dusting, glass cleaning, and so forth.	3.50	each
19. Travel, set up, and check out room.	1.00	each
20. Clean drinking fountains—single	2.00	each
double	2.70	each
triple	3.40	each
quad	4.00	each
21. Hose down sidewalks.	1.50	100 square feet
22. Hose down blacktop.	3.00	100 square feet
23. Allow for difficult classroom furniture arrangement..	2.30	each

Custodial Benchmark Standards

Clean Elementary Classroom (Resilient Floor)—Total Time, 21.7 Minutes

Work content	*Area or quantity*	*Unit standard*	*Total standard*
1. Dust-mop.	900 sq. ft.	1.46	13.1
2. Clean chalkboard and tray.	1	2.32	2.32
3. Dust and do miscellaneous tasks.	1	3.50	3.50
4. Clean sink and drainboard.	1	1.73	1.73
5. Travel, set up, and check out room.	1	1.00	1.00

Clean Portable Classroom (Resilient Floor)—Total Time, 19.9 Minutes

1. Dust-mop.	900 sq. ft.	1.46	13.1
2. Clean chalkboard and tray.	1	2.32	2.32
3. Dust and do miscellaneous tasks.	1	3.50	3.50
4. Travel, set up, and check out room.	1	1.00	1.00

Custodial Benchmark Standards (Continued)

Clean Intermediate Classroom (Carpeted Floor)—Total Time, 20.3 Minutes

Work content	*Area or quantity*	*Unit standard*	*Total standard*
1. Vacuum light soil.	900 sq. ft.	1.32	11.88
2. Vacuum heavy soil (traffic areas).	900 sq. ft.	.18	1.62
3. Dust and do miscellaneous tasks.	1	3.50	3.50
4. Clean chalkboard and tray.	1	2.32	2.32
5. Travel, setup, and check out room.	1	1.00	1.00

Clean Elementary Classroom (Carpeted Floor)—Total time, 22.6 Minutes

1. Vacuum light soil.	900 sq. ft.	1.32	11.88
2. Vacuum heavy soil (traffic areas).	900 sq ft.	.18	1.62
3. Clean sink and drainboard.	1	2.32	2.32
4. Dust and do miscellaneous tasks.	1	3.50	3.50
5. Clean chalkboard and tray.	1	2.32	2.32
6. Travel, set up, and check out room.	1	1.00	1.00

Clean Single Washroom—Total Time 7.0 Minutes

1. Sweep.	100 sq. ft.	.8	.8
2. Clean lavatory, dispensers, and mirrors.	1	1.54	1.54
3. Clean stool.	1	1.73	1.73
4. Wet-mop.	100 sq. ft.	1.90	1.90
5. Travel, set up, and check out room.	1	1.00	1.00

Additional Benchmark Standards

Work area	*Total time (in minutes)*
Clean double washroom.	13.8
Clean student washroom (average).	21.6
Allow for difficult furniture arrangement.	2.3

Daily Allowance for Personal Time—Custodial Work

Activity	*Time (in minutes)*
Coffee breaks (2)	20
Personal hygiene	10
Interruption/travel	15
Waiting	10
Getting job assignment	15
Set up/put away	20
Total	90

The time allowed for the administrative and personal tasks listed above is based on realistic estimates and equals 1.5 hours of each 8-hour shift. Based on this estimate, 6.5 hours are available for productive work.

Custodial Standard Application Sheet
Elementary School

Work description	*Quantity or area*	*Minutes per unit*	*Total minutes*
Office building			72.8*
Kindergartens	2	34.8	69.6
Restooms	8	17.1	137.0
Multipurpose room			76.7*
Classrooms	20	22.6	452.0
Library			26.8*
Teachers' workrooms	5	4.9	24.5
Sidewalks (sweeping weekly)			34.8*
Locking and unlocking building			30.0*
Stage			15.3*
Allowance for difficult classroom arrangement	13	2.30	30.0*
Total basic work			969.5
Basic hours			16.2
Start and stop time (2 custodians)			.7*
Total daily hours			16.9
Add nonscheduled hours			2.0*
Total productive custodial time required			18.9

18.9 hours divided by 6.5 productive hours per shift = 2.91 custodians required

*The total minutes allotted to these areas are calculated individually on the basis of the size of the individual area, the tasks or frequency of tasks to be performed for each area, and the documented time needed to perform the tasks.

Custodial Standard Application Sheet
Middle School

Work description	*Quantity or area*	*Minutes per unit*	*Total minutes*
Teaching stations	21	22.5	472.5
Student restrooms	6	21.6	129.6
Adult restrooms	2	14	28.0
Hallways	2	7	14.0
Library/media	1	18	18.0*
Multipurpose room			28.0*
Kitchen area			5.0*
Music room			5.0*
Tiny tot's trailer			21.5*
Double portable (intersession)			42.0*

*The total minutes allotted to these areas are calculated individually on the basis of the size of the individual area, the tasks or frequency of tasks to be performed for each area, and the documented time needed to perform the tasks.

Custodial Standard Application Sheet, Middle School (Concluded)

Work description	*Quantity or area*	*Minutes per unit*	*Total minutes*
Single portable			21.0*
Teaching areas cleaning time			784.6
Office and teacher lounge area cleaning time			86.0*
Outside areas cleaning time			178.0*
Total cleaning time			1048.6
Head custodian time for school functions			180.0*
Community service/civic functions/preventive maintenance			150.0*
Total productive time required			1378.6

*The total minutes allotted to these areas are calculated individually on the basis of the size of the individual area, the tasks or frequency of tasks to be performed for each area, and the documented time needed to perform the tasks.

Summary Calculations

Total productive time required (minutes)	1378.6 minutes
Total productive time required (hours)	22.98 hours
Total number of custodians required (22.98 - 6.5 = 3.54)	3.54 custodians

Summary by Area and Function

Teaching areas cleaning time = 784.6 minutes (784.6 ÷ 60 minutes = 13.08 hours) (13.08 hours ÷ 6.5 hours productive time = 2.01 custodians)	13.08 hours
Office, teachers' lounge, and outside areas cleaning time (178 minutes + 86 = 264 ÷ 60 = 4.4 hours)	4.4 hours
Head custodian time for school functions (180 ÷ 60 = 3 hours)	3.0 hours
Community service/civic functions/preventive maintenance (150 ÷ 60 = 2.5 hours)	2.5 hours
Total productive time required	22.98 hours
Total number of custodians required (22.98 ÷ 6.5 = 3.54)	3.54 custodians

Breakdown of Operations Tasks by Unit and Time Allotment*

	Minutes per 1,000 square feet
Sweeping	
Unobstructed	7
Slightly obstructed	9
Obstructed	10
Heavily obstructed	14

	Minutes per 1,000 square feet
Dust mopping	
Unobstructed	8
Slightly obstructed	9
Obstructed	10
Heavily obstructed	12

*In addition to the time standards illustrated in the San Joaquin task-time formula, information is available that contains approximations of time needed for various individual cleaning jobs. Because the building's layout and method of construction, the sanitation level required, and obstacles likely to be encountered will cause considerable variance in any time standard, this should be considred only a general guide.

*Breakdown of Operations Task by Unit and Time Allotment (Continued)**

	Minutes per 1,000 square feet
Damp mopping	
Unobstructed	16
Slightly obstructed	23
Obstructed	27
Heavily obstructed	32
Wet mopping and rinsing	
Unobstructed	35
Slightly obstructed	45
Obstructed	50
Heavily obstructed	55
Machine scrubbing (16-inch machine)	
Unobstructed	27
Slightly obstructed	38
Obstructed	44
Heavily obstructed	49
Machine buffing (16-inch machine)	
Unobstructed	16
Slightly obstructed	27
Obstructed	33
Heavily obstructed	38
Vacuuming (wet pick-up)	
Unobstructed	20
Slightly obstructed	27
Obstructed	31
Heavily obstructed	35
Vacuuming (dry pick-up)	
Unobstructed	14
Slightly obstructed	17
Obstructed	19
Heavily obstructed	23
Stripping and rewaxing	
Unobstructed	100
Slightly obstructed	120
Obstructed	140
Heavily obstructed	130
Using combination scrub and wet pick-up automatic machine	3-12

	Time in seconds
Dusting	
Bookcases	
13 inches × 35 inches × 12 inches	22
36 inches × 30 inches × 8 inches	33
36 inches × 40 inches × 12 inches	36
42 inches × 24 inches × 11 inches	49
Cabinets	
30 inches × 66 inches × 18 inches	42
36 inches × 77 inches × 18 inches	56
Chairs	
Large	63
Medium	35
Steno	22
Clocks	
Desk	8
Wall	20
Desks	
Large	48
Medium	43
Small	38
Desk items, miscellaneous	3
Doors (two sides)	
Without glass	24
With glass	40
Files	
Four-drawer	22
Five-drawer	27
Fire extinguishers	16
Lamps and lights	
Wall, fluorescent	8
Desk, fluorescent	18
Table, with shade	35
Floor, with shade	35
Partitions, glass (50 square feet)	60
Pictures	
Large (3 feet × 5 feet)	45
Medium	15
Small	12
Radiators and window ledges	
124 inches × 15 inches	45
Radiators (flush with wall)	
40 inches × 30 inches× 6 inches	21
Tables	
Large	60
Medium	35
Small	22
Telephones	9
Typewriters (covered)	7
Vending machines	60
Venetian blinds (standard size)	210
Wastebaskets	15

***In addition to the time standards illustrated in the San Joaquin task-time formula, information is available that contains approximations of time needed for various individual cleaning jobs. Because the building's layout and method of construction, the sanitation level required, and obstacles likely to be encountered will cause considerable variance in any time standard, this should be considred only a general guide.**

Breakdown of Operations Task by Unit and Time Allotment (Concluded)*

	Time in seconds
Cleaning lavatory items	
Commodes (with partitions)	180
Doors (spot-wash)	50
Mirrors	
25 inches × 49 inches	20
60 inches × 21 inches	20
88 inches × 31 inches	40
Napkins	
Dispensers	13
Disposals	10
Paper towel	
Dispensers	7
Disposals	10

	Time in seconds
Shelving	
20 inches long	8
126 inches × 6 inches	60
Urinals (complete)	60
Wainscoting (75 feet to 100 feet)	90
Wash basins (complete)	120
Washing glass	
Clear, 8 square feet	60
Opaque, 20 square feet	60
Miscellaneous cleaning	
Doors (washing)	150
Drinking fountains (cleaning)	90

***In addition to the time standards illustrated in the San Joaquin task-time formula, information is available that contains approximations of time needed for various individual cleaning jobs. Because the building's layout and method of construction, the sanitation level required, and obstacles likely to be encountered will cause considerable variance in any time standard, this should be considred only a general guide.**

Denver Custodial Formula

Classification	*Points per day*	*Units or basis*
School site (picking up paper and rubbish on grounds and policing general area)	1	Each acre
Building units (sweeping, dusting, emptying wastebaskets and pencil sharpeners; cleaning chalkboards and erasers; adjusting shades; locking windows)	1-1/3	Each building unit (classroom equivalent)
Kindergartens (sweeping twice daily)	2-1/3	Each kindergarten
Lunchrooms and multipurpose rooms	1	Each 30 seats or chairs
Auditoriums	1	Each 150 seats
Heating plant (operating gas-fired plants, supervising and checking)	2	Each plant
Plumbing fixtures (servicing fixtures and facilities, such as lavatories, water closets, urinals, service sinks, drinking fountains, shower heads, mirrors)	1	Each 10 fixtures
Gymnasiums (cleaning)	1	Each 2,400 square feet
Community use of buildings (working three to four hours later than usual each night the building is used)	1	
High use (150—190 meetings per year)	15	
Medium use (90—149 meetings per year)	10	
Low use (10—89 meetings per year)	5	

Denver Custodial Formula (Concluded)

Classification	*Points per day*	*Units or basis*
Building area (doing miscellaneous tasks, such as sweeping halls, cleaning door glass, emptying trash containers, mopping toilet floors, locking and unlocking doors, replacing broken glass, washing windows, making out reports, replacing sash and sash cords, replacing light bulbs, adjusting and repairing furniture, washing walls, and burning trash). Special cases in which certain parts of the building are not in use or in which other unusual circumstances exist are allocated points in relation to the specific building.	1	1,000 square feet of floor space

An example of the application of this points allocation formula to a specific school plant is presented in the following ratings:

Element	*Size or other measurement*	*Points*	*Based on per*	*Total points*
Grounds	10 acres	1	Acre	10.00
Building units	24	1-1/3	Building units	32.00
Kindergarten	2	2-1/3	Kindergarten	4.66
Lunchroom	180 seats	1	30 seats	6.00

An example of the application of this points allocation formula to a specific school plant is presented in the following ratings:

Element	*Size or other measurement*	*Points*	*Based on per*	*Total points*
Grounds	10 acres	1	Acre	10.00
Building units	24	1-1/3	Building units	32.00
Kindergarten	2	2-1/3	Kindergarten	4.66
Lunchroom	180 seats	1	30 seats	6.00
Auditorium	266 seats	1	150 seats	1.77
Heating plant	Gas-fired plant	2	Plant	2.00
Plumbing fixtures	146 fixtures	1	10 fixtures	14.60
Gymnasium	2,135 square feet	1	2,400 square feet	.88
Community use	71 meetings a year	5	(Low use)	5.00
Building area	53,185 square feet	1	1,000 square feet	53.19
Total points				130.10

130.10 multiplied by ¼ hour = 32.53 hours per day of custodial time

In this point system no allowance is included for care of lawn and shrubbery if building custodians are responsible for watering the lawn and shrubbery. An actual study should be made of the time required to care for the lawn and shrubbery. This figure should be added to the estimate.

Area Allotment per Person-Hour Formula

Under this formula the area allotments for custodians are listed as follows:

Area	*Square feet per hour*
Permanent buildings (including porches and steps)	2,400
Locker and shower rooms	1,400
Portables (including porches and steps)	2,000
Sidewalks and drives	7,500
Grounds (including parkway and gutters)	34,000
Lawns and planted areas (including parkway and gutters)—watering and mowing	20,000
	Units per hour
Isolated trees and shrubs (basining and watering trees in unplanted areas)	250

For a school gardener assigned to take complete care of the outside planted areas, the area allotments would be as follows:

Area	*Square feet per hour*
Lawns and planted areas (including parkway and gutters)	10,000
Athletic fields	20,000
	Units per hour
Isolated trees and shrubs	160

Appendix C

Evaluating a School District's Custodial Program

The following questions can assist school district administrators in evaluating the district's custodial program.

Relationship to the District's Educational Program

Do the governing board policies provide adequately for rules and regulations relating to custodial services?

Is meeting the needs of the district's educational program the primary objective of the custodial program?

Does the building program provide adequately for storage space, work stations, and other physical facilities needed for custodial services?

Does the building program recognize the importance of selecting materials that contribute to efficient custodial operations as well as low maintenance costs?

Do district standards for furnishing classrooms provide for enough space to facilitate custodial work?

Have the duties and working relationships of the principals and the supervisor of the district's custodial operations been clearly established to promote harmonious, efficient custodial operations?

Does the school district's budget provide the necessary funds to carry on a detailed, carefully planned custodial services program?

Do annual budgets provide adequately for the purchase and replacement of custodial equipment?

Have custodial services been considered and custodial personnel been involved in the development and operation of the district's safety program?

Does the district's educational program encourage pupils to respect school facilities?

Are written rules and regulations regarding use of school facilities by community groups effectively enforced so as not to cause undue custodial problems?

General Administration

Do personnel responsible for supervision of custodial services keep current with best practices through membership in professional associations, review of technical literature, visits to other school plants, and other related techniques?

Does the district maintain an up-to-date organizational chart that shows the supervisorial relationships for the district's custodial services?

Have the legal provisions affecting custodial services been compiled on a current basis and are they available for reference?

Do district policies and procedures cover clothing or uniform requirements?

Has careful attention been given to the design and use of forms, such as those used to report repair needs not in the scope of custodial services?

Have procedures been developed covering the prompt reporting of unsafe conditions or maintenance needs?

Have procedures been established to return or dispose of articles found by custodial employees?

Do procedures provide for a follow-up on school facilities and equipment during the time they are under warranty?

Are plans readily available that show the physical layout for each site and essential information regarding location of utility lines, meter locations, shut-off valves, fire alarms, and other essential information?

Are lighting, heating, and ventilating systems equipped with automatic controls?

Has the district established care for the American and California flags?

Have arrangements been made with local police authorities for patrol services?

Are inspection services, such as those available from other governmental agencies or insurance companies, used to advantage in the custodial program?

Do custodial supervisors spend most of their time supervising and not waiting for emergencies?

Personnel

Do the district's personnel procedures ensure that supervisory employees are thoroughly experienced and trained in custodial work?

Do the district's personnel procedures contain provisions to screen applicants for custodial jobs and permit supervisors to participate in actual selection?

Are all custodial services positions included in the salary schedule?

Are salaries established at levels which will attract and keep capable custodial employees?

Are applicants for regular custodial positions encouraged to work first in substitute or temporary positions?

Do the personnel procedures ensure that new employees' personal attributes, qualifications, and character meet job requirements?

Do personnel procedures ensure that new employees are free from physical defects or health conditions that would interfere with their work?

Do personnel procedures ensure that custodial employees whose duties require them to drive possess a valid license?

Are current job descriptions maintained for all custodial services positions?

Has an effective in-service training program for custodial employees been established?

Does the district's in-service training program prepare custodial employees for their contact with community members, other employees, and pupils?

Does the in-service training program provide custodial employees with information about the organization and operation of the school district?

Have written procedures been established to help custodial employees in performing their jobs?

Methods, Materials, and Equipment

Are the formulas used in allocating work based on careful study of factors such as floor type, amount of furniture, traffic, and area?

Have precise time schedules been developed that indicate the specific, routine tasks and the time they should be performed?

Are most custodial tasks scheduled during late afternoons and evenings when work is less likely to be interrupted by school activities?

Are custodial staff members aware of new methods, materials, and equipment?

Is the prevention of communicable diseases a factor in selecting cleaning materials and developing custodial methods?

Does the district's list of standard supplies provide adequately for custodial needs?

Are custodial materials tested before they are purchased?

Are only supplies that are used purchased, even though "per gallon" or "per pound" prices of various products and dilutions may appear less expensive?

Has a list of electric fixtures and applicable lamps been prepared for each school?

Has a standard list of custodial equipment for each school been established?

Have procedures for the most efficient use of custodial equipment been established?

Visits to Sites

Are visits made periodically to all sites to evaluate the custodial services program?

Does the visit to a school include a meeting with the principal to discuss ways to provide custodial services that will facilitate the educational program?

Does each visit to a school include actual spot checks of the cafeteria, restrooms, classrooms, and other areas?

Do visits to schools and other sites allow administrators to assess custodial needs, determine whether schedules and standards are being met, and suggest ways to improve efficiency?

Evaluating the Custodial Program in Schools

Relationship to Total Program

Have the head custodian and the principal established a good working relationship?

Does the head custodian work cooperatively with all other supervisory personnel, such as the vice-principal or cafeteria manager?

Do the custodial employees get along well with community members, other employees, and pupils?

Do the principal and head custodian carefully prepare budgetary requests?

Are vendors' representatives permitted to contact custodial personnel at the school only through arrangement with the district office?

Are requests for extra custodial services, except in emergency, directed to the head custodian for scheduling rather than to the custodian doing the work?

General Conditions

Are classrooms equipped according to the district's standards and not cluttered by extra furnishings?

Do teachers follow established procedures concerning the clearing of desk tops or other top surfaces, closing windows, and locking all the doors at the close of the day?

Do pupils fulfill their cleanup obligations in homemaking and industrial arts classes?

Do pupils show respect for school facilities by not writing on the walls and damaging property?

Are automatic controls for lighting, heating, and ventilating properly used?

Are doors and windows in air-conditioned areas kept closed?

Personnel

Does the head custodian participate in in-service training?

Are all custodial employees familiar with plant layout and the locations of fire alarms, shut-off valves, and other such items that may be used in an emergency?

Do custodial employees understand the duties they are expected to perform in emergencies and fire drills?

Do custodial personnel follow fire prevention practices?

Are custodial personnel skilled in the proper use of fire extinguishers?

Do custodial personnel actively participate in the safety program?

Do custodial personnel wear the required clothing or uniform?

Methods, Materials, and Equipment

Do custodial personnel follow the established work schedule?

Is the custodial work performed during school hours accomplished without undue disturbance to school personnel and pupils?

Are requisitions for custodial supplies and equipment submitted promptly?

Are custodial supplies safeguarded properly and used only for authorized purposes?

Are proper materials and methods used in operations to prevent communicable diseases?

Is special care used when handling equipment or supplies that may be harmful or hazardous?

Are lamps replaced with those approved by the school district?

Are glides installed on furniture and equipment to protect floor surfaces?

Does the location of waste receptacles encourage the efficient use of custodians' time?

Does school district policy encourage the efficient use of utilities, such as keeping the thermostats at a constant temperature?

Are all doors and windows locked and the building secured at the appropriate times?

Other Considerations

Are accidents, such as spilling of ink or paint, properly reported and cleaned up?

Are unsafe conditions or items needing repair promptly reported?

Are defects in school facilities or equipment that are still under warranty promptly reported?

Are items that have been identified as defective by supervisors repaired promptly?

Publications Available from the Department of Education

This publication is one of over 600 that are available from the California State Department of Education. Some of the more recent publications or those of special interest to the users of this publication are the following:

Accounting Procedures for Student Organizations (1979)	$1.50
Administration of Maintenance and Operations in California School Districts (1986)	6.75
Administration of the School District Budget (1983)	3.00
Administration of the School District Risk Management Program (1977)	2.50
Attendance and Enrollment Accounting in California Public Schools (1977)	2.80
California Private School Directory	9.00
California Public School Directory	14.00
California School Accounting Manual (1984)	4.50
California School Business Procedures and Management In-service Training (1980)	1.50
Liability Insurance in California Public Schools (1978)	2.00
Loss Control Supplement, Administration of Risk Management Program (1979)	1.50
Manual of First-Aid Practices for School Bus Drivers (1983)	1.75
School Bus Inspection and Maintenance Guide (1978)	2.00
Selected Financial and Related Data for California Public Schools (1985)	3.00
Site Management (1977)	1.50
Work Permit Handbook (1985)	6.00

Orders should be directed to:

California State Department of Education
P.O. Box 271
Sacramento, CA 95802-0271

Remittance or purchase order must accompany order. Purchase orders without checks are accepted only from government agencies in California. Sales tax should be added to all orders from California purchasers.

A complete list of publications available from the Department, including apprenticeship instructional materials, may be obtained by writing to the address listed above.

A list of approximately 140 diskettes and accompanying manuals, available to members of the California Computing Consortium, may also be obtained by writing to the same address.

86 80309

82-111 03-0350 300 2-86 4,500